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A Retrospective Review of the California University Competition.

IT is often asserted that the true history of any world-famous event cannot be written until all the participators are dead, when all the passions excited and the interests to be served are stilled. However, the results of Mrs. Phœbe Hearst's munificent undertaking are likely to be so far-reaching, and the present stage of the proceedings is so merely preparatory, that there seems to be no impropriety in discussing judicially what has really been accomplished. If Mrs. Hearst had accomplished nothing more than to arouse a more general interest in the relation of fine art to education and to sane existence, everybody the world over should be grateful.

The invitation to the architects of the world, to enter in competition for the Californian University scheme, must have been received with some incredulity, or a larger number of designs would have been submitted in the first competition at Antwerp. The data furnished were exhaustive and the conditions comprehensive. Every guarantee that could be desired was given to assure the most sceptical that the awards would be a recognition of merit, however obscure; and yet little more than one hundred architects availed themselves of an opportunity that has hardly ever been equalled—an ideal and ample site, whose peculiarities were minutely set forth in topographical maps and exhaustive particulars, even to the annual rainfall, while the requirements of every department of a great university were clearly and thoroughly stipulated. The arduous and expensive labour involved in the preparation of all these data, freely given to every architect who would take the trouble to ask for them, after all inspired only the number who were represented at Antwerp to attempt something really great, unhampered by sordid considerations.

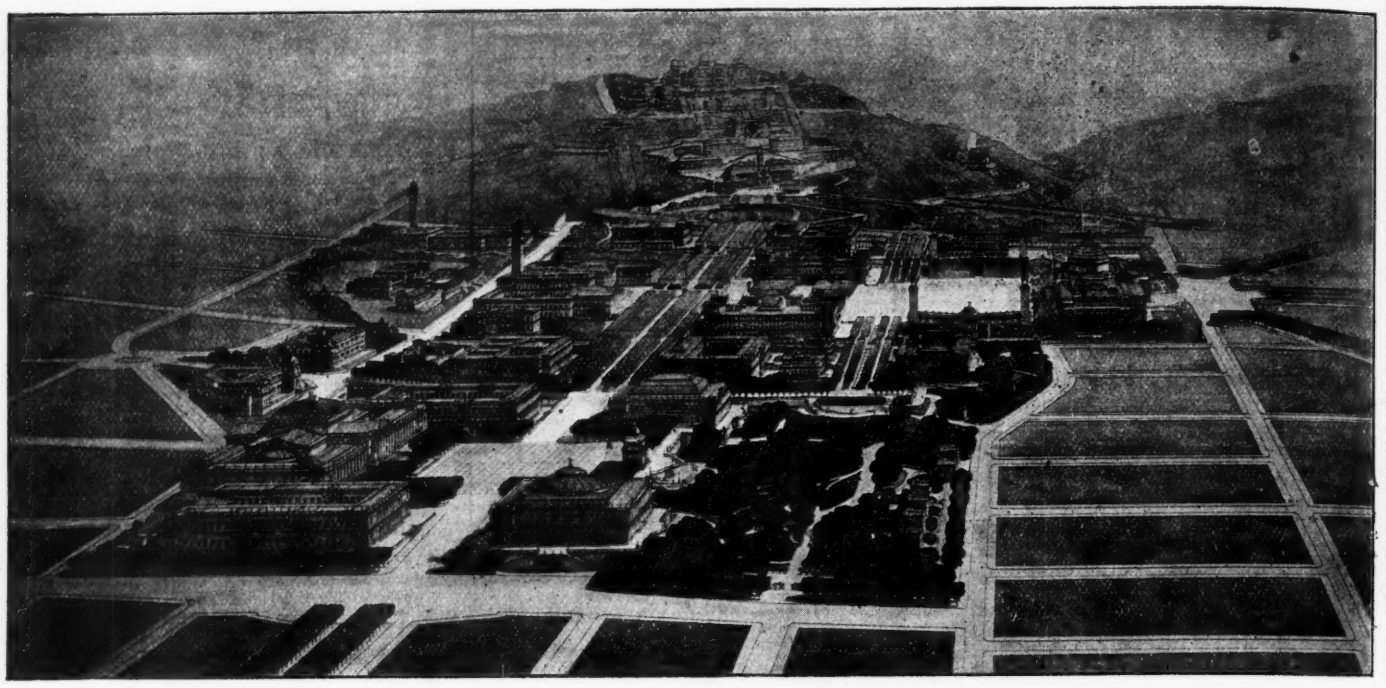
There are no means of judging now whether the jury that met at Antwerp a year ago to select designs for the final competition did their duty well or ill, because the hundred or more designs submitted are scattered to the four winds, and we are called upon to accept the judgment that the eleven designs selected for the final competition were the best. The professional standing of four members of the jury should be a sufficient guarantee that substantial justice was done. But it is difficult to understand what object was served by including Mr. J. B. Reinstein in the jury, as he is not an architect, or even a person who by education or experience could be qualified to judge any work of fine art. He has, however, the distinction of being a Regent of the University, and has also an assistant who organised the whole competition, superintended the unpacking and hanging of all the drawings, and has been general manager from first to last. This gentleman, Mr. Maybeck, is an instructor in architectural drawing at the University, and is, we believe, a graduate of the École des Beaux-Arts of Paris; so that, as far as any judgment is concerned, Mr. Reinstein was Mr. Maybeck's second. The jury spent so little time in determining the first competition at Antwerp that it must have been impossible to examine and intelligently pass judgment upon the merits of half the designs submitted, unless one is willing to admit that these hundred designs were mostly beneath criticism. We could even believe this if we had not seen several of the designs that were rejected, and did not know the names and abilities of several other competitors who were also among the rejected. Of the designs we have seen, at least three were distinctly and essentially better than six of the eleven selected. But the designers of these three were not graduates of the École des Beaux-Arts, and all the eleven whose designs were selected for the final competition are.

One can understand that Mr. Walter Cook and Mr. Pascal, and probably Mr. Wallot, may honestly see no merit in any architectural work that does not bear the ear-marks of the École des Beaux-Arts; but what was Mr. Norman Shaw doing on that jury that he did not insist on a careful study of designs without those ear-marks, just to see if by chance they might have some merit?

It is, unfortunately, not possible now to discover whether these one hundred competitors were really representative or not. It is hardly possible to judge whether they even included a fair representation of American architects. The names of the Americans who were selected at Antwerp would seem to indicate that they represented only a certain phase or type of American architecture; and as the Americans must have been much the largest number of the competitors, it follows that other nations were not represented in any degree to warrant valuable conclusions. The French architects, and those who received their professional training in France, seem to have been more fully represented than any other variety.

It is to be regretted that the plans submitted at Antwerp were not retained, and all finally exhibited, in order to show from what material the eleven designs in the final competition were selected. The professional standing of the gentlemen composing the majority of the jury is an absolute guarantee that they acted with every sense of responsibility, but one is forced to the conclusion that they sympathised only with one type of architectural design, and thus found it easy to dispose of the first competition at Antwerp in an incredibly short time.

Of any hundred designs submitted in open competition, it should be easy to eliminate fifty as plainly inadequate, in a few hours; but to reduce this fifty to twenty-five should occupy several days of patient study. These designs were necessarily the result of months of thought, and however competent a man may be to form a judgment on the merits of a design, he cannot do so without understanding the attitude of the designer. It would seem that a judicial decision to reduce the twenty-five designs to eleven, should have involved so many



California University Competition: General View of First Premiated Design. M. Bénard, Architect.

considerations as to consume at least another week, unless we are willing to accept the theory that the eleven were so manifestly superior to the remaining ninety odd as to be appreciated almost at a glance.

It is curious that this superiority invariably takes the shape of French Renaissance, in conceptions of the whole scheme that suggest the Paris Exhibition rather than a university. This objection, however, is not so evident in the treatment of the problem by M. Bénard, who has handsomely won the first premium; and would perhaps have been entitled to it under any circumstances, as against all comers.

It is to be noted that several of the prize winners ignored some of the peremptory conditions of the first competition, such as the connexion of all the buildings of the university proper, in order that the whole institution might be traversed under cover; the roofing of the seats in the stadion or athletic amphitheatre, and the actual plan of the streets of the adjoining town. However, these points would be of small importance and could be reconciled, if what remains were essentially and incontestably first rate. This excellence may certainly be claimed for M. Bénard's design, whatever one's prejudices in style may be; and the group of university buildings by Messrs. Howells, Stokes, and Hornbostel is really fine, dignified, and serious, entitling them to the second premium among these eleven designs; they have, however, failed to handle the whole scheme, which is a question of landscape architecture that cannot be evaded, and it must be admitted that this splendid group of buildings for the college proper is so designed as to gain nothing from its surroundings.

It should seem that there must be other bases of design than French Renaissance which could be made effective in a monumental group of university buildings. Perhaps the late Mr. H. H. Richardson could have given us a suggestion in Romanesque that would have been at least a wholesome concession to sane traditions. Many of the most important monuments in the world are Gothic, and some of the dearest associations of college life cluster round ivy-mantled crenellated towers. On the other hand, a frankly Greek treatment of a stadion or athletic amphitheatre, and a Roman treatment of a great bath, have much to recommend them. The complaint is that these graduates of the École des Beaux-Arts gave us no opportunity to weigh all these considerations, and seem to believe that architecture means French Renaissance, whatever purpose is to be served. There is, perhaps, a reason why a modern theatre should be designed in Louis XIV. Roccoco, as an acknowledgment of the influence of Molière; and by the same process the influence of the monastery establishments of the Middle Ages on our libraries and universities can hardly be ignored in monuments to education. Of course a group of buildings of one institution cannot be made an architectural museum of style, with the observatory in Mooresque staring at the stadion in Greek and a library in some type of Gothic; but to make no concession whatever to historical association of ideas in a great university is at least misleading to the average student. The idea of dignified repose that one associates with a university seems to have troubled these designers very little. The exhibition was an imposing display of architectural draughtsmanship; sometimes a little freakish and startling, but always skilful and effective.

The third, fourth and fifth premiums seem to have been awarded on the theory that somebody must have them, and that it does not much matter who. The important considerations involved in the treatment of such a stupendous undertaking as this are so innumerable that the greatest architects of whom we have any record would require years of contemplation properly to balance them. There is no one of us who pretends to any training and experience who has not had visions of grand architectural effects, influenced by our individual associations and predilections. The advantages or disadvantages of a certain site, coupled with a certain set of requirements, must evoke images of colonnades, arcades, domes, towers, or spires; but when an attempt is made to realise these dreams, our fancies must take some tangible, rational shape, and take hold on the earth as we find it, beset with limitations. It is questionable whether *carte blanche* is ever a good starting point.

M. Bénard is evidently older in wisdom if not in years than the rest of the competitors. His problem has never escaped him; he has never lost sight of his limitations. He has accepted his site as the basis of all, and moves no shovelful of earth without careful consideration. He moves as little earth as possible, and always has a place to put it where it is needed. He preserves a decorum and unity in his whole composition, quite independent of the particular treatment of each structure. One can see that he appreciates the difficulties—we had almost said the impossibilities—of the problem, and instinctively feels that the plan of his grounds, with their open spaces and their lines of communication, must be designed on the same principles as his buildings, to avoid the temporary and festive effect that results in surprises and lack of unity. Messrs. Howells, Stokes, & Hornbostel, on the contrary, seem to have had a vision of a fine architectural group or mass of buildings, and looked about for a plateau on which to set it, confident that the rest could be handled accordingly; but they have found no better solution than to plot a monotonous row of ineffective dwellings on either side of a broad avenue leading to their main and initial idea; resulting in the effect of a factory village overshadowed by a palace, presumably occupied by the successful master of toil. The palace is really very magnificent, an imposing and dignified mass, well proportioned and beautiful. And for a palace there is, perhaps, no better expression than French Renaissance is capable of.

In the other designs one is at first deceived by the scale, as the designers often seem to have been. In architecture it is peculiarly true that differences in degree become differences in kind; as an instance, Mansard overdid his attempts at grandeur in the design of the park façade of the Palace of Versailles. The grand flight of steps to the terrace is too wide to be effective, and makes

the ramp and parapet insignificant. With the same spirit of vaulting ambition some of these architects planned vast areas in circles and piazzas that would be disappointing, and result in dreary wastes, with the surrounding buildings too distant to be included in the scheme. M. Bénard does not give you a chance to look one of his buildings in the face till he has got you at the proper distance to see what it means, and how large it really is. The line of a retaining wall and parapet is never forced by him to compromise a difficulty, but is, like the width of his avenues and the planting of his trees, all an essential part of his architectural plan. One may admit that size is the first element of grandeur, but after all mere size will hardly suffice, for there is nothing grand about the largest sky-scraping American office building, with its thousands of windows destroying its repose. No work of art can be made grand by merely making it big. On the other hand, a comparatively small thing can have constitutional dignity and repose.

Mr. Codman and his French associate who obtained the third premium seem to have been carried away with the Exhibition idea, and have even heightened their drawings with pyrotechnic effects.

Mr. Lowell once said that a man must be a great leader or misleader of men who after sixty years of this world had preserved a clarified residuum of experience that deserved to be called an opinion. Nevertheless, one is inclined to risk the unqualified assertion that a university should look like an institution of learning. Of course, different images will present themselves to the mind's eye of different people; but among people of European civilisation, with the same general associations and traditions, there is no likelihood of a gaol being mistaken for a theatre, or a race track for a university.

Some one of these eleven gentlemen of French training and proclivities might, at least, have given us a treatment of this problem in that beautiful Transitional period of Louis XII. to Francis I., which Frenchmen call "La belle Renaissance," and in which there is enough Gothic feeling to satisfy the traditional sentiment of which the scheme cannot wholly divest itself. This style is so flexible in competent hands as to be, perhaps, better adapted to such an undertaking than any other.

Another competitor, Mr. Whitney Warren, conceives a university as an athletic institution with libraries, chemical laboratories, and such distractions grouped about the main feature or stadion. He sets forth his argument in sunny watercolour drawings, and whether one is ready to accept his theory or not, there is really much more to be said in favour of his conception than of Mr. Codman's. It has more repose than almost any of the designs submitted, but somehow lacks the monumental character that in the other designs seems to have been the main object. Another competitor thought the Place du Carrousel façade of the Louvre a good motive; but the sumptuousness that, perhaps, allured him evaporates in his attempt to stretch the composition over so much ground, because the proportions are sacrificed owing to want of height, and he could merely enlarge his model in dimensions and detail. Hence he was obliged to string his pavilions together as best he could, introducing some foreign elements to prevent a certain baldness that he had exchanged for a lack of repose and dignity.

M. Dick boldly offered us an acropolis, with imposing walls surmounted by a national capitol, whose dome would reflect the last rays of the sun beyond "the golden gate." The scale of some of these things was colossal, as, for instance, in the octagonal auditorium by M. Eichmüller. The arches in the drum of the dome are more than 100 ft. in span. These magnificent dimensions must be measured and considered to be apppreciated; 5 millimètres to the mètre conveys so little idea to most people. M. Bénard has peopled his drawings, so that the average beholder is able to appreciate the vastness of these piles and the distances that separate them (see lithograph illustrations). There were figures in some of the other drawings, but somehow they do not help matters much, and leave us with rather vague impressions, as if we had dreamed, and, waking, could not recall any coherent sensations. Perhaps these architects imbibed too much of this imaginative scheme in too short a time, and naturally became a little incoherent. For it must be remembered that while the data for the competition occupied the time of several persons for more than a year, only six months were allowed in which to design the preliminary sketches submitted at Antwerp, and only ten months to prepare the drawings that constitute the work of the eleven designs in the recent exhibition.

We have avoided as far as possible in what we have said expressing any personal preference for anything whatever, and have conceded the excellence of M. Bénard's conception and execution as a matter of comparison, and in speaking of the other designs we have tried to suggest what they really are. There is a certain audacity and lack of reverence for real art in the attempt to handle this gigantic task at all, especially in competition with all comers. What we have found reassuring in M. Bénard's work is, not that it is the finest conception imaginable, or that it is any complete solution of an almost impossible problem: but that it is a practical, useful collection of buildings, planned like a city, with many fine effects to be enjoyed as in strolling about you shall discover them. There is no attempt to build a spectacle to be seen from afar—a city in the clouds. That the rotunda of the dome of the gymnasium would be accepted as being the approach to the auditorium of a grand opera house rather than the entrance lobby of a college gymnasium, cannot be denied; nor that all his buildings, as far as we can judge, have more the character of palaces and municipal offices than of university buildings. One is inclined to assert that all these architects have conceived the whole scheme on a Titanic scale; that they have been instigated by the idea of unlimited resources, and have begun by including too large a portion of the earth's surface. There is very little left of this beautiful site when they have done. The distances they have planned may be magnificent, but they must prove practically inconvenient. A college *campus*, to which the whole of Union-square, New York, is a mere building-plot, can hardly be said to be a feature of a coherent plan. We believe it is intended to overcome such disadvantages by electric railways, bicycle tracks, automobiles, or whatever means of rapid transit may be most available; but it would seem that a concentration of the college buildings at the most convenient part of these undulating acres would not disturb so much of the natural beauty of the site, and would result in a more comprehensive scheme.

No one could possibly get a view of the whole design without a balloon or a tower built for the purpose, and from such a position much of the effect that is architectural must be lost. A shimmering of objects might be descried from a boat on the Bay, and be pointed out as the great university; or from some point of vantage on the hills a bird's-eye view of all these roofs might give an idea of what a city it all is. But the views shown in the perspective drawings in this collection can only be commanded from balloons, and are therefore misleading. Even the general elevations of the whole can never be seen. The angle of vision from any given standpoint can only include a certain number of degrees vertically and horizontally; and in looking at a building a 1,000 ft. long and some 200 ft. high, a distance is required, to appreciate the whole, which must render the details unintelligible, while any objects behind must rise to great heights to be seen at all. Size is relative, but in architecture it is relative to the height and faculties of a human being. The awe-inspiring masses the Egyptians have left us would lose their grandeur and eternal repose if they were pierced with hundreds of windows and worried with all sorts of architectural details.

To return to the starting-point of these criticisms and suggestions, there must have been some designs among that hundred at Antwerp that did not spread over the whole landscape, and that were not so colossal, so impressively architectural, and so intensely French: but the jury evidently did not take any interest in them. Perhaps they thought that Americans like everything as big as possible, and did what was expected of them. This theory would account for the generally bombastic character of these eleven designs, and for the very few days occupied in selecting them—fewer than were spent on awarding these five prizes.

After a conscientious effort to comprehend the scope of Mrs. Hearst's scheme, and many patient hours spent in trying to understand what these particular architects would attempt in actual practice, one finds one's self asking the question whether there are not, after all, some things that cannot be bought; whether a university can be conceived and completed on a settled plan, even for one hundred million dollars paid in, as they say of corporation stock. The very inconsistencies and incongruities that, architecturally speaking, gather in and about an old university have a certain value. This competition has very surely taught us not to attempt to manufacture what must grow by its own inscrutable laws. What M. Bénard thinks a university should be is well worth knowing, and not less important is what so well equipped a jury think of what he thinks. The unprofessional public does not know what to think, but they have more respect for professional training than ever before; they have seen such evidences of it as they are not likely to forget; and even if these cloud-capped towers and gorgeous palaces shall for any reason never be realised, Mrs. Hearst has

done a thousand times more for education in its broadest sense than could have been achieved by contributing the large sum involved in any other way.

It is, perhaps, a matter of congratulation that there is no immediate prospect of making more than a beginning in the realisation of this great enterprise, because we live so fast that new requirements are constantly arising. The importance of electrical study in comparison with even twenty years ago is an illustration; and who shall say what may be the demands of a well-equipped university fifty years hence?

NOTES.

Offering Commissions to Architects.

We are glad to see from a letter in the *Birmingham Daily Post* of Tuesday last that the Birmingham Architectural Association is taking up a decisive attitude in regard to offers of underhand commissions to architects. The Hon. Secretaries, Mr. Silk and Mr. McKewan, quote in their letter a portion of a circular—apparently one of those on which we have already commented, and add:—

"It is the earnest endeavour of the Architectural Association (all members of which are required to sign a declaration not to accept illicit commissions of any kind) to put a stop to the offering of such by manufacturers. We trust that you will find space for this in your columns, as it is only by drawing the attention of the building public to these matters that we can hope to stamp out the practice."

In our correspondence column will be found a letter from a provincial architect, who states that he has for a long time past adopted the practice which we recommended in our last issue, of informing all firms who offer a commission that in consequence of such offer he cannot employ them. As we have already observed, if architects generally would take the trouble to do this the practice would be stamped out.

Light Railways.

The large number of schemes tabulated to come before the Light Railway Commissioners next session shows the marked development which is pending in the tramway system of the country. This is partly due, no doubt, to the facilities given by the Light Railways Act, but it also shows the effect of electrical progress, and of the feeling which is very strong in many populous districts for better popular means of locomotion. Among the well-to-do middle classes who can afford to use carriages and cabs there exists a prejudice, wholly selfish, against the extension of the tramway system. There can, however, be no doubt that the masses of the population desire and need easier modes of locomotion. England is very much behind Continental and American towns in this respect—a fact which is now being understood. As soon as the popular demand for tramways becomes pronounced it is useless for limited classes to oppose it. *Primâ facie*, also comfortable and cheap locomotion is desirable for the general convenience of the whole community.

The Metropolitan Electric Supply Company.

The dwellers in Marylebone who use the electric light have apparently good ground for complaint against their supply company. From private sources we have heard many complaints about their action in interrupting the supply for hours at a time, often without notice, and their conduct in giving unsatisfactory explanations to their justly-irritated clients. From a letter in Saturday's *Times* we learn, on the authority of "Some Inhabitants of Harley-street," that the supply was cut off seventeen times without notice for periods varying from two and a half to four hours during the last eight weeks, often at the time of the maximum load. Naturally, many of their customers are threatening legal proceedings, and many more have written to the Board of Trade and the Vestry asking them to impose the heavy penalties provided by the law on the company unless it maintain a constant supply. The mistake the Metropolitan Company seems to have made is in not pushing forward their extensions rapidly enough. A company whose area of supply is $4\frac{1}{2}$ square miles of one of the wealthiest districts in London ought to have been prepared for a great and rapid extension of its business. The new power station and generating works at Willesden ought to have been hurried through at all costs. After the disastrous fire at their Manchester-square station in the summer of 1898, the London Electric Supply Company came to their rescue and supplied them with electricity at wholesale rates, and this enabled them to struggle through last winter; but the necessity of maintaining their moderate dividend makes them unwilling to have recourse to outside aid longer than they can help. The present state of affairs illustrates that an electric lighting company with parliamentary obligations finds itself in an awkward position when more consumers than they can provide for insist on being connected on to their mains. Some of the interruptions may be caused by changing over the system from high tension to low tension, and if so a notification to this effect would doubtless mollify many of their clients, who are at the present time in an extremely pugnacious mood.

Concrete and Expanded Metal Slabs.

Investigations as to the strength of materials are so infrequently made by bodies of professional and business men, for their own use, that we cordially welcome a Report issued recently by a joint committee representing the Northern Architectural Association, the Newcastle, Gateshead, and Tyne District Master Builders' Association, and the Building Trades Exchange of Newcastle. This committee was appointed early this year to organise and conduct an independent test of the comparative breaking strengths of concrete slabs made with and without the addition of expanded metal. Under the superintendence of a sub-committee twelve slabs were prepared with some care, various sizes, thicknesses, and gaugings being adopted. The slabs were set up on wood centrings and brick piers in July, the centrings being removed on August 16 and the tests made on September 19 and 20 last. All the results then ascertained are recorded in the Report now issued. Unfortunately for the practical value of the tests, no two slabs, respectively with and without metal, were of uniform dimensions, so that exact comparison under stress is not possible. In some cases where areas agree thicknesses differ, the slabs without metal being made thicker "to equal the value of the metal omitted." No such equation suggests itself to us, nor is it established by the results ascertained, which can only be applied in a comparative sense by the aid of calculations. The ordinary mind wants to grasp some simple statement, such as the following:—Two concrete slabs, each a ft. long, b ft. wide, c in. thick, and gauged in the proportions of d to e, (1) with metal inserted, (2) made in the ordinary way, were found, when supported at each end, to break under the following evenly distributed loads, viz.:—(1) Under x lbs. per square foot, and (2) under y lbs. per square foot. If a series of facts like this were accumulated, demonstrating the breaking loads for various pairs of slabs of various defined spans, thicknesses, and gauging, information of practical value would be afforded. This sort of knowledge has not been furnished by the Report we are now discussing. Out of the six pairs of tests, intended to be approximately comparative, four were abortive, either because the slabs broke beforehand or because they could not conveniently be loaded up to the breaking point. The two remaining tests gave results which are at variance with a Report made some time ago by Sir John Fowler and Sir Benjamin Baker. For instance, these experts state "that the use of expanded metal in the case of a 3 ft. 6 in. span increases strength from six to eight times, and in the case of a 6 ft. 6 in. span to ten and eleven times." On the other hand, the two completed Newcastle tests indicate that in a 4 ft. span strength is increased twenty times, and in a 5 ft. 6 in. span by six times. These are the actual figures, disregarding differences of gauging, and the fact that the non-strengthened slabs were 50 per cent. thicker than those including metal. Evidently something is wrong here, and if it is fair to judge by the breakage of the slabs which came to a premature end, we should be inclined to think uniformity of strength in the material to have been a doubtful quantity. We are in entire sympathy with the objects of the Newcastle committee, and trust any further investigations they may make will be so conducted as to arrive at more precise results.

The Electric Drainage of New Orleans.

An interesting paper by Mr. Lyman Reed appears in a recent number of the *Electrical World* of New York, on the electric drainage of New Orleans. The land upon which this city, one of the most important in America, is built, is perfectly flat, and at high water it lies from 3 ft. to 6 ft. below the level of the Mississippi, from which it is protected by embankments of earth. As a great portion of it was originally a swamp, and the soil is so damp that cellars are impossible, it will be seen that the drainage of the city is one of peculiar difficulty. There are no sewers, open gutters only are used to carry the rain water into canals. The streets were formerly often flooded, the canals and pumping plant being insufficient to cope with the demand made on them during rain storms, which are of exceptional severity in that climate. The new system that has been designed is chiefly remarkable because all the centrifugal pumps used are worked by high tension electricity from one central station. The main canal has been divided into five sections, and an artificial slope given to each so as to cause the water to flow. Powerful pumps, connected direct to horizontal motors, pump the water from the end of

one section into the beginning of the next. The power-house building is complete, and 1,800-horse power is at present supplied to three of the stations by means of three phase currents conveyed on overhead wires at a pressure of 3,300 volts. The wires are for the greater part of their length bare. Over swamp land square piles 40 ft. long are driven 30 ft. into the earth, and the electric poles are bolted on to them. The entire system of drainage is thus controlled from one point. This is, in many respects, preferable to individual steam pumping stations. The ultimate power required for the seven pumping stations will be just over 4,900-horse power. The efficiency of the entire system of distribution is calculated to be between 50 and 60 per cent. of the power generated at the central station.

Photography Without the Aid of Light.

THE word photography cannot, of course, be correctly applied to the process of reproducing pictures upon photographic plates in the absence of light, but since the plates and the methods of development employed are identical with those used in true photography, the absurd phrase "photography without light" is for the moment the most serviceable. Some time ago we drew attention to the fact that Dr. Russell had discovered that pictures drawn upon metals or upon certain other substances can be reproduced upon a photographic plate in the absence of light, and without placing the photographic plate in contact with the surface of the picture to be reproduced. It was also shown that this action upon the photographic plate was not prevented by the interposition of a screen of celluloid, tracing-paper, or certain other substances between the picture and the plate; but that a screen of glass, on the other hand, did prevent the reproduction of the picture. In another paper recently communicated by Dr. Russell to the Royal Society it is shown that hydrogen peroxide is the active agent in reproducing the pictures upon the plates. The metals which act most strongly on a photographic plate are those which decompose water most readily. The terpenes, which by oxidation yield hydrogen peroxide, are practically the only organic compounds which act upon photographic plates in this manner.

The Queen Victoria Gallery.

CHELSEA has opened a small gallery for the display of prints, drawings, and other matters of interest concerning the parish of Chelsea. It is called the Queen Victoria Gallery of the Central Public Library. The gallery was informally opened to the public on Monday. The collection on view has been gradually acquired through many years by the Commissioners of Public Libraries. Mr. Bryden, the architect to the library, has prepared plans for the future extension—as funds will permit—of this gallery or museum. The present collection forms a valuable nucleus, for little of old Chelsea now remains, and here are preserved records of the residences of famous men such as Sir Thos. More, Smollett, Holman Hunt, Turner, Rossetti, besides the Chelsea bun-house, Winchester Palace, The Royal Hospital, and the old Parish Church. It also preserves to posterity some beautiful mezzotint portraits of Sir Thos. More, Dean Swift, Sir Hans Sloane, John Pym, Lord Burghley, Sir Robert Walpole, and others. The good example of Chelsea should set other public libraries moving in the same direction. No better memorial to the Queen's long reign could be devised than the collection of valuable works of art and antiquarian records, properly housed in the neighbourhood of their immediate interest.

The Society of Painters in Water-Colours.

THE Winter Exhibition of this Society contains, as usual, a large proportion of excellent works, but it is time that the committee should consider seriously the injury done to their credit by some of the coarse and commonplace works to which the best positions are given. Look at Mr. Macbeth's "Pangbourne-on-Thames" (40), Mr. Brewtnall's theatrical piece of claptrap "The Last Days of the Sea-rover" (70), Mr. Carl Haag's chromolithograph (it looks like) "One of Said Pasha's Body-guard" (129), and Mr. Glindoni's big piece of commonplace "The Love Letter" (235):—What do such works "on the line"? If their authors, as members, have a right to be hung, surely they have not a right to the best position. The first number on the catalogue introduces us to a specimen of the "blottesque" school, "The Path to the 'Spaniards,' Hampstead Heath" (1), by Mr. Robert Little, who is blottesque in all his exhibits. It is astonishing how one gets demoralised; Mr. Arthur Melville's first exhibit at the Society was greeted with bewilderment and some laughter; now his "Bravo, Toro" (73) occupies the central position on the end wall, and finds calm acceptance; nor do we deny his ability and his eye for colour, but it is a flashy kind of art. On the other hand, the fact that the winter exhibition was originally said to be one of "sketches and studies" (a distinction now dropped) justifies Mr. Thorne Waite's several very fine "rapid sketches" (191, 194, 197, and 200)—really such, and not professing to be finished pictures; also Miss Rose Barton's woodland sketch "Going to School" (53). Mrs. Allingham contributes seven drawings, with some variations from her usual style of subject; "Near Burton," for instance (106), a meadow glorious with the yellow sheen of flowers, and "Above Whitby" (134), a study of an expanse of heather. Mr. Albert Goodwin is surely carrying delicacy of effect and tint a little too far; his "Elvet Bridge, Durham" (21), and "Windsor" (141) are rather dreams than pictures. Mr. Tom Lloyd sends a beautifully finished little coast scene, "The Top of the Cliff" (10), with the "wrinkled sea" below, which we much prefer to his more typical and more mannered work "The Fish-pond" (20). Among things in the broad style of the best school of water-colour landscape-painting are Mr. Philip's two works, "Study of a Sunlit Hillside" (47) and "Ben Doran, Argyllshire" (226), with its two vast parallel slopes of hill; Mr. Eyre Walker's "In the Merionethshire Hills" (113), a small landscape in a great style, and his "In an Old Orchard" (128), and "Hawthorns by the Sea" (103), and Mr. Napier Hemy's fine "Sea Study" (190). Among architectural subjects Mr. S. J. Hodson has a view of "Chartres" (29), rather matter-of-fact in treatment; Miss Rose Barton a Westminster scene, "The House Sitting" (97), a little too obviously modelled on Mr. Herbert Marshall; and Mr. Smallfield a small but very effectively composed view of "The Spire of Harrow-on-the-Hill" (94). Mr. Walter Crane is hardly benefiting himself by exhibiting such a work as "A September Morning" (100), a vulgar-looking woman in a yellow dress walking in a badly-painted garden, nor yet by the figure of "London," a costume study for the Guildhall masque, and good as such, but the figure is ten heads high—by measurement.

The Goupil Gallery.

AT the Goupil Gallery is a collection of water-colour sketches by Mr. Brabazon, an amateur with an eye for colour, who has been flattered by his friends and a section of the Press into thinking that his exceedingly rough sketches—first memoranda for pictures they might be called—are worth exhibiting to the public. There are good effects, or suggestions of effect, in some of them, but if this kind of crude splashing is to make a man an artist, that distinction is more easily earned than we had been accustomed to think. Some of the architectural subjects, "The Rialto" and "Place St. Marc from the Canal," for instance, are really too absurd.

SCOTTISH ARCHITECTURAL MATTERS LOOKED AT FROM THE OUTSIDE.*

POSSIBLY when your Council suggested that on this occasion a lay brother should be asked to occupy the chair, it may have been actuated by the desire of hearing how architectural matters were looked at from the outside. In that respect I think they have been successful. For, though loving and delighting in the architecture both of the past and the present, it is utterly beyond my power to make a design, to lay down a plan, to show a section, to throw an arch, or even, I fear, to build a decent wall. I can only tell you how I think a building looks when it is up, hazard some view as to its age, its style, or its effect, &c., and with reference to your profession, indicate what occurs to me as to your aims, your rights, and your responsibilities. Your field is now so wide, and, with our civilisation and wealth, always becoming so much wider, that I can, of course, speak but in terms more or less applicable to the various fields in which you work. In architecture, as in everything else, there is a tendency to specialisation, and with specialisation the qualifications for work become more and more differentiated. Not very many years ago, architects had, as a rule, to deal with the erection of barn-like churches; simple rectangular halls, inns, and hotels hardly differing from the ordinary dwellings surrounding them; plain and unadorned places of business; small schools. Now, from our enormously developed wealth, and a craving after, I hope, higher and better things, the demand is for churches on ecclesiastical lines; ornate places of business; great schools, museums, and libraries that shall indicate from without that there are treasures within; hotels that might well be thought Royal palaces; newspaper offices that shall outwardly show the power of the fourth estate; refuse destructors that shall not only destroy rubbish but be pleasant to look on. In every direction, it seems to me, you are called on to deal with a demand for buildings of more distinct individuality, greater size, increased richness. Looking at many of the erections of our day, one almost feels as if—at all events in the mansions of our rich men and in the centre of our great cities—the golden age of architecture had already come. Let any one look on some of our recently-built mansion houses, or what is to-day doing in the principal streets of Edinburgh and Glasgow, and I think he will admit that there is a good deal to be said for the triumph of modern architecture. No doubt, however, there is another side to the picture. There are the mean approaches to our cities—the dismal factories, the bleak warehouses, the dull tenements—plentiful indications everywhere of the over-keen competition in the race for wealth. Still one often sees, where hardly looked for, the evidence of a wish to escape from bleakness and dull uniformity, and an attempt, even at

* Address delivered to the Edinburgh Architectur Association, November 29, by Mr. James Bruce, President.

added cost, to obtain something that the eye will rest on with more or less pleasure.

I shall endeavour to indicate what appear to me should be the functions and aims of an Association such as ours as respects the members of your profession and the outer public.

They are, I think, somewhat as follows:—With regard to architects, I think our Associations should try to secure that they are well equipped, both theoretically and practically, for the duties devolving upon them—that their rights are duly recognised and their responsibilities not unduly stretched with regard to their work. I think our endeavours should be that buildings should primarily be safe in themselves, and suitable in design for the purpose for which they are intended: that they should possess individuality, be harmonious and in keeping with their surroundings, and have in as high degree as possible that beauty of form which, like wine, makes glad the heart of man.

To these aims I would add another with reference to the old buildings of our land. I think our Association should take all means in its power to see that our venerable historic buildings are thoughtfully cared for; that restorations, when made, are real restorations, not destructions; and that accurate delineations are made of the outline and detail of the buildings that constitute the rich architectural heritage that has come down to us from days gone by.

Let me touch on these various points, and first as to our share in helping with the equipment of our architects.

At the foundation, I think we should try to make it imperative that our architects should possess a competent knowledge of the laws of construction. Our buildings must first of all be safe. Owing to the value of ground in towns the architect must sometimes pile story on story, till the question of strain on what is below becomes almost an engineering problem. Height, no doubt, often gives dignity, but height carried too far gives anything but a pleasurable feeling.

I have never been in America, but I have seen representations of American city skyscrapers, and I have read of the mode of their construction. I do not think that, except, possibly, in an occasional instance, even the tallest has added laurels to the brows of its designer. Gigantic steel frames with the interstices filled in with ready-made building material, with twelve or fourteen monotonous stories piled high into the air, they can hardly but be disappointing in outward aspect. No doubt, with mechanical lifts, telephones, and all the newest appliances they may, with their extensive accommodation, fill in certain localities useful enough ends. They may, I readily grant, come under the list of the useful, but, unless in some exceptional instances, they do not to my mind even approach the category of the beautiful. They may be wonderful engineering feats, but they cannot be called architectural triumphs.

Next to having full knowledge of the rules governing construction the competent architect should, I think, have a good grasp of architecture in its historical aspect. Each of the great historical styles has been worked out to definite conclusions. You may design in one style or in another—or you may use combinations. But it will only be an architect with competent knowledge of what his art has achieved that will be able to furnish designs either in one style or in another, or in a blending of styles, that will produce results enduringly satisfactory. How, then, is the equipment of an architect at present acquired? It is got principally, I understand, in apprenticeship and assistantship in your offices, supplemented by private study and visits to buildings. In addition, some of our building members have given valuable help by direct teaching. Then there is a school of applied art to which our Association has largely contributed. At the Heriot Walk College there are classes for construction, masonry, and design. But in our University, with its magnificent provision for teaching, though there is a chair of Engineering, there is no chair of Architecture. There is no doubt a chair of Fine Art of the occupant of which I desire to speak in the very highest terms. His work must have had an immense effect in raising the tone of taste and diffusing invaluable knowledge in art matters. But the expression "fine art" covers a wide field, of which architecture is but a portion, and it does seem to me desirable that, among the other chairs in our University for specific teaching, we should have a chair of Architecture. Looking to the wide interest of the subject and its vast importance to the comfort and well-being of the people, it is surprising that our University does not already possess such a chair. We have just had noble architectural gifts given us in the University Hall, the Public Library, the provision for a Town Hall. Chairs have just been founded by private munificence of Public Health and Historical Research. Might not some one of our many wealthy men come forward and endow a chair of Architecture? Such a gift would not only be a boon to our University and to your profession, but to our country. I do not mean a chair merely for the education of the professional architect; I mean a chair that would both give this and also spread the knowledge and love of architecture among the community. It would, I think, be very desirable that some knowledge of Architecture formed a recognised part of a liberal education.

As to the rights and responsibilities of architects, an Association such as ours could, I think, do something towards forwarding a movement for putting these rights and responsibilities on a somewhat more satisfactory basis than at present. Here I know I am treading on somewhat delicate ground. Architecture is an art as well as a profession, but still I think we might with advantage encourage steps towards uniting those in Scotland who practice architecture as a profession in some recognised corporate body. At present any one, I understand, without the slightest test of qualification, may call himself an architect and be in a position to practise as such. In this matter, I think the public is entitled to some protection. To those who can discriminate, matters are all very well as they are. But to those who cannot, it would be a boon if there were some standard on which they could rely, and that standard could be got by all practising architects being required to pass certain tests, and that they had done so could be guaranteed by their membership of some recognised body. Again, I think architects need some protection themselves. In a recent case the question arose what superintendence an architect was bound to give before issuing certificates to a contractor. Apparently there were no Scottish rules that could be referred to on either side, and I understand the Court indicated that the rules of the Institute of British Architects could not even be looked at. Cases of measure of responsibility in various directions may of course every now and then crop up, and may have serious consequences. I do not say that even recognised rules would settle every question, but they would at all events be something to go on.

I now touch on the results that I think such an Association as ours should try to secure in work. These are, I think, primarily, stability and suitability. With regard to stability, one is thankful how safe our Scottish buildings are; secure in progress and sound on completion. Such a catastrophe as that which some time ago occurred in the collapse of the block of chambers at Westminster has not, so far as I know, happened in Scotland. The strength of a chain is but the strength of its weakest link, and though this as a rule does not apply to a building, yet we must see that every part is fit to stand both the weight and the thrust that may be thrown upon it. I do not say that we can always provide against unseen contingencies. We cannot, I fear, even with the greatest care, claim immunity from the effect of sudden storm, as we recently sadly felt in Edinburgh, but we can provide against inherent weakness. For this we are in Scotland very favourably placed, looking to the admirable nature of the building material we generally have close at hand. The safety of our buildings may also, to some extent, be due to the proverbial caution of our Scottish nature, but I gladly think that this safety is substantially due to the grip our Scottish architects possess of the principles of construction.

Suitability to purpose is the other cardinal requirement we need to insist on. Not merely general suitability, with proper provision for ingress and egress, lighting and heating, ventilation and sanitation, but special adaptation to special requirements. Be a building ever so sound in itself or ever so attractive in outward form, if it be useless for the purpose for which it is designed it is nothing but a failure. Suitability is such a cardinal matter that I need hardly press its importance. I will but say that the nearer our architects approach entire suitability in their buildings to the purposes for which they are intended the nearer will the buildings be to perfection.

Passing from stability and suitability, there are many points which must of course more or less claim our care. Let me point out some of the more important. And first let me touch on individuality. A church should not only be a church, and a dwelling a dwelling, but each should, in addition to the characteristics of its class, have those distinctive differences that distinguish an original from a mere copy. Further, we should strive that what holds good for a whole holds good for the parts of which it is made up. No part of a building should seem to be what it is not. It should be free from pretentious excrescences that contain nothing and lead nowhere. Shams are utterly indefensible, and can give no real or lasting satisfaction.

Then, I think, each of our buildings should form one harmonious whole and be in keeping with its surroundings. A building may have any number of good separate features, but if they do not blend into one good composition, it will not give pleasure but pain. It should further be in keeping with its surroundings A building that would look well with some. thing at its back may be quite out of place where it has nothing behind it. One building suits a hillside, another a level plain, and to transpose them would be to ruin both. A building may suit admirably a busy street and be thrown away on a quiet country side. We must do what we can to promote good taste. Generally speaking, the building must be in-keeping with its surroundings, but sometimes the surroundings must be brought into keeping with the building. Within certain limits the architect should, if practicable, have power to control his surroundings. We want the "house beautiful" in the "surrounding beautiful." A lapidary cuts his gem and makes for it a suitable setting—and both combined form the perfect jewel. So with the building—the architect should, if possible, frame it, and thus complete his design. It is not, however, easy to say where the province of the architect ends and the province of the landscape gardener begins. Flowers and grass, trees and shrubs are all desirable as adjuncts; but on the building itself leafage drapery should, I think, be used but sparingly. A building should show itself to be a building, and not appear to be a mass of greenery with indications of mason work peeping out here and there.

Again, near our buildings statuary should, I think, be but sparingly used. In street architecture its use seems to me to be in many cases desirable, both as reminding many of persons well deserving of remembrance, but also as giving points on which the eye may rest with interest in the midst of much uniformity. When, however, the statues are at all near one another, they should be on the same scale of size. Differences in this point in nearly adjoining statues are most exasperating. Instances of discrepancy with unhappy effect may be seen both in George-square, Glasgow, and at the east end of our own East Princes-street Gardens. With regard, however, to our Edinburgh statues in general, with great deference I think Lord Rosebery's denunciation of them was far too sweeping. Among them we have not only good portraits, but good works of art. George IV. is dignified and royal; Pitt is a forceful statesman; Chalmers is characteristically massive and strong; Allan Ramsay, our only marble statue, is picturesque. Instead of hurrying down our steep places, and burying themselves in the Forth, our Edinburgh statues are, I think, much better occupied in calmly abiding where they are.

Once on a time the delight was to use in the garden or pleasure-ground adjoining the house statuary or plaster casts without stint. The results must sometimes have been more startling than pleasing, and as years went by things must often have become deplorable. Take the case of a building with beside it a collection such as that described by a witty Frenchman as follows:—"The large basin no longer held any water, and the dolphins which in days gone by spurted it from their throats looked as if they asked each other to what purpose they were in this world. But the statues had suffered most. Moss and a green damp had invaded them as if some kind of plague or leprosy had covered them with sores, and pitiless time had inflicted on them mutilations and insults. One had lost an arm,

another a leg ; almost all had lost their noses. There was in the basin a Neptune whose face was sadly damaged, and who had nothing left but his beard and half his trident, and further on a Jupiter without a head, the rain standing in his hollowed neck." The gods and goddesses have gone from our gardens and pleasure-grounds, and we are glad they have been followed by the men and beasts and fishes and birds and ships into which our trees and shrubs were once clipped. I do not say we should have no statuary in our surroundings, but if we have let it be real and good, and used with a sparing hand. I do not say that we should never interfere with shrubs and trees growing at their own sweet will—but if we carry our interference very far it becomes annoying, and at last ludicrous. Let me as a companion picture to the dilapidated gods and goddesses quote Pope's description of a collection of clipped trees :—"Adam and Eve in yew, Adam a little shattered by the fall of the Tree of Knowledge in the great storm. Eve and serpent very flourishing. St. George in box, his arm scarce long enough, but will be in a condition to stick the dragon by next April. Divers eminent modern poets in bays, somewhat blighted, to be disposed of by the pennyworth ; a quick-set hog shot up into a porcupine by its being forgot a week in rainy weather." Satire such as this killed the clippings, and the matter of taste in laying out the surroundings of our buildings is at present, I think, decidedly healthy.

Let me say a word as to the requirement of beauty. To me it seems that in building beauty largely consists in gracefulness and accuracy of line, apparent strength, harmony in colour, true proportion of parts, and—when we can get it—richness in detail. Beauty has a thousand aspects, but I think there is one thing underlying all, and that is evident truth, accurate lines, perfect curves ; no doubt suggested as to how some poor ineffective base supports, some mighty superincumbent weight—clear suitability of design to purpose. A beautiful building perhaps gives wider pleasure than any other form that art assumes. It can be seen, and is seen, by all without effort. To appreciate a picture or a statue, you must go near, you must spend time, you must concentrate attention ; but a beautiful building, with its clear lines, its harmony of parts, its well-blended colours, its dignity, its strength, its repose, its indication of comfort, impresses the mere passer-by, and, though it may be all unconsciously to him, gives him a sensation of pleasure and satisfaction, and sends him on his way a brighter and a happier man.

I have given you my views as to the requirements we should aim at in our buildings, and you may possibly reply this is all very well, but they are but counsels of perfection, and how can an architect give a perfect building unless he be provided with adequate means? I fully grant in many cases the justice of the reply. All I say is that what I have indicated are aims, and that sometimes, when you are asked to design a building at a cost you feel to be inadequate ; you might hint the extreme desirability of a little more liberal expenditure. I am perfectly aware that there are employers to whom such a hint could not be judiciously given, but I think there are others who would not only take the hint but thank you for giving it.

I now come to the last of the points to which I think the endeavours of such an Association as ours may profitably be directed, the effort to secure the protection of our old historic buildings and the preservation of an accurate record of their features. Our old buildings are records in stone of the life of our country, and when we are asked what title deeds we have in Scotland to show that our cultivation is not of yesterday and that we are the inheritors of an old noble national life, I answer, among the most important of our title-deeds are our old buildings. The authors of a recent history of architecture have well pointed out the influences that have affected buildings. They class these as geographical, geological, climatal, religious, social, and historical. Now in every one of these respects how interesting are our old Scottish buildings. From the earth house or the broch of our early forefathers to the splendid dwelling of to-day there is a vast distance in time and there is an enormous stride in architecture, but from our earliest building to our latest there is a continuous life history of our people.

The geography of our land, our building material, our climate, our religious changes, our social development, our picturesque history have all made their impress on our buildings, and buildings with such a wide sweep of interest are surely entitled to our reverential care. Some of them have had this ; others have been grievously neglected. Private owners, one is glad to think, are more and more perceiving their value, and every now and then some old castle or mansion is being restored or cared for ; and no greater boon can come to a country side than when some wealthy landowner looks round to see what of the past he can carefully preserve. I wish what can be said of many of our private owners could be said of our successive Governments. Think of the Hall of Edinburgh Castle, after being disfigured till almost beyond recognition, only restored by private generosity. Think of the roofless Chapel of Linlithgow Palace. Think of the Palace in Stirling Castle with its sectioned rooms and smashed fireplaces. Think of the noble hall in the same castle divided into stories and cut up into rooms to serve for barrack and canteen accommodation, and all to save a few paltry thousand pounds that would really never have been missed from the national exchequer. Suppose Greece, in a fit of economy, were to use some of the best of its ancient statues for sign-posts at converging roadways. Suppose Italy were to take some of the masterpieces of its great painters, paint lines across them to turn them into suitably sized sections, and then consign them to a factory to serve as patterns for the production of wall papers; would not the civilised world howl with indignation—and among the howls would not the British howl be among the loudest? But yet year by year we calmly agree that some of the noblest specimens of our national architectural heritage shall either be roofless, or else be battered and broken and cut up to give us some paltry accommodation which at trifling cost we could easily get elsewhere. It is hardly credible that our Scottish members can session after session permit this misuse to go on without indignant protest, and do not unite as one man, irrespective of party, to demand that the neglect and misuse of our old historic national buildings be at once put a stop to, and the buildings treated in future with all fitting respect.

I now come to the final point to which I wish to direct your attention, viz., the preservation of an accurate record of the features of our old Scottish buildings. In this matter two of our members have rendered inestimable service. In their Castellated and Domestic and their Ecclesiastical Architecture of Scotland, Messrs. MacGibbon & Ross have done a national work of the highest value. In their simply invaluable volumes we have the architecture of our land spread out before us. We can see it in all its phases and changes. In the Castellated and Domestic Architecture we have every important castle and mansion between the twelfth and eighteenth centuries competently described and illustrated both by plans and elevation, and in the Ecclesiastical Architecture we have every important ecclesiastical building which has come down to us from our earliest Christian times to the close of the seventeenth century treated in the same satisfactory way. The immense knowledge and care and time and trouble that have been brought to bear on these books have made them of surpassing value, not only in Scottish architecture, but to Scottish history. They are, in fact, a perfect storehouse of knowledge, and whoever has the good fortune to possess them may well pride himself on their possession. The University of St. Andrews has done itself honour by conferring a doctor's degree on one of the authors, but it seems to me that it would be but right and fitting that the authors should receive some national recognition of the value of their services.

We, ourselves, have done a good deal towards preserving the lineaments of our old buildings. Our "Sketch Books" between 1875 and 1892 cover a large field and one full of most admirable work, and one of especial value from the number of their measured drawings. It would be well if they were in the hands of every Scottish architect, both for delight and use. We have further worked in this interesting field by the publication of our transactions between 1889 and 1894. I do not know if we can at present look to the immediate resumption of our sketch-book work, but I think the Council may well now think of resuming the publication of our transactions. We have been most generous, according to our means, to the School of Applied Art, but now that secondary education is occupying so largely the attention of Government, I would venture to hope that we may be relieved of the necessity from further money contributions to the school, and be enabled to apply our resources more fully to our own direct work.

I have now sketched out for you what appear to me to be the functions and aims of an Association such as ours. During our forty years of existence I think we have done much through our meetings, our classes, our sketch-books, our visits to buildings, and the publication of our transactions, to further the course of architecture in Scotland ; and the field is wide before us for the future. I do not say an Association such as ours can perhaps take any very active steps in the direction I have indicated. We cannot force those who purpose entering the architectural profession to take the training that seems desirable ; we cannot insist on their passing any examination as a test of fitness ; we cannot compel the giving of good work ; we cannot demand the safeguarding of our national treasures ; but we can at least advocate what seems right in professional matters—insist on the importance of high ideals, and give what encouragement we can to their realisation ; and we can help in some degree with regard to our old buildings to guide public opinion into right channels.

ART AS APPLIED TO THE WEAVING AND PRINTING OF TEXTILE FABRICS.

[THE following is the substance of the paper read by Sir Thomas Wardle at the Architectural Association, on November 24, which, as promised last week, we have modified in the wording, where necessary, so as to convey the information contained in it in a form which will be intelligible apart from the illustrations to which constant reference was made. Twenty of the lantern illustrations, however, we have reproduced on a lithograph plate ; the portions of the paper referring to these illustrations are left in their original form. For reference, we have numbered them consecutively from 1 to 20, but giving in brackets the number which each slide bore in the lecturer's original list.]

The textile industry is one of the earliest on record. History and the ancient monuments of Egypt clearly prove its existence for at least 6,000 years. We possess no textiles of that early period, but the paintings in the pyramids show the Egyptians clothed in garments of red, blue, and yellow, with patterned geometrical devices, of which the lotus and papyrus plants and the scarabæus or dung beetle predominate, as well as other motives, chiefly of sacred animals and other plants.

It is a pleasing idea that the designing of patterns from the earliest times was dominated by a meaning. The term "unmeaning" so often and so justly applied nowadays, well characterises the patterns, as a whole, of the last 100 years or more. The meanings which educed the older designs were chiefly symbolical of religious beliefs, as witness one of the earliest Egyptian ornaments, the scarabæus, which has been well described as follows :—"This insect has the remarkable habit of laying its eggs in excrement, with which it envelops the egg, and of forming a little ball. The beetle draws this ball after it with its hind legs until the surface hardens. The ball, which contains the embryo of a new life, and which the heat of the sun will awaken, was to the Egyptians symbolical of the globe, out of which new life would spring, and also of the minuteness of the Creator's work." Likewise, the lotus and papyrus plants which prevail in Egyptian architecture and painting were symbols of the nourishment of the body and mind.

The sculptured records of the Assyrians show that this ancient people were not behind in the textile arts. Fig. 1 (see lithograph) shows a piece of the dress of an Assyrian king, upon which are shown figures of men in long, flowing robes, with a variety of mythical subjects, and in the centre is the disc of the sun, ascending on the wings of an eagle, the symbol alike of Egyptian and Assyrian sun worship, below which is the Hom or tree of life, with its pomegranate-like fruit.

In the Bible we find a number of references to the textile arts. In the thirty-fifth chapter of Exodus, Moses, speaking of the ten large tapestries of the Tabernacle, says : "Them

hath God filled with wisdom of heart, to work all manner of work of the engraver, and of the cunning workman, and of the embroiderer in blue and in purple, and in fine linen, and of the weaver;" and further, in the thirty-ninth chapter, Moses, in speaking of Aaron's priestly dress, states: "And they made upon the hems of the robe pomegranates of blue and purple and scarlet and twined linen." What fruit is there which has dominated artistic decorative design like the pomegranate in all the succeeding ages, and worthily, for it was the symbol of love. Jupiter made the bridal Juno taste of pomegranates.

In the circle surrounding the tree of life you will see alternate palmettos and pomegranates; the figures are those of priests. The winged figures are cherubim with human and eagles' heads.

For thousands of years before our era China has practised the weaver's and embroider's arts, and, above all other countries, the materials were chiefly of silk. The printing of fabrics in China and Japan is both curious and interesting. Some of it is done without blocks, especially in Japan, by stencilling through stiff paper in which the designs are cut. This work is often enriched by embroidery being worked upon it, and very artistic effects are thus obtained. Of the antiquity of printing in these countries history does not give us much information, but the treatment of their colouring and designing is of a very traditional kind, the latter belonging to the grotesque and symbolic category; but in flower drawing they excel. We can, I think, safely infer from their modern craftsmanship what was characteristic of their ancient work. A great feature of Chinese designing is their adherence to ancient ideals, and a great reluctance to change or to be influenced by modern styles, for Chinese art in textile work, like that of Indian—of which I shall presently have more to say—rests where it has been for ages.

The Chinese fantastic treatment of figure forms may be said to be typified in their dragons, the most important of which has the head of a chameleon, the horns of a stag, the claws of an eagle, and the tail of a serpent, this is symbolic of supreme wisdom. The dragon is the martial device of the Emperor, and that of the Empress is the phœnix. The phœnix, with a peacock's tail and head covered with protuberances, is the symbol of a long and happy life.

It is impossible in the circumscribed space of one paper to cover the whole archæological textile ground, and, therefore, the textile work of many countries, such as those of Greece and Rome, must necessarily be omitted. But the patterned cloths of Byzantium must find a place, especially as our European museums and churches are rich in vestures of that time, and more especially so from the fact that Byzantine patterns, culminating probably in Justinian's time, did not lose their influence in the pattern-designer's mind for many centuries after—say up to the fourteenth century—as I shall be able to show.

It is to the Emperor Justinian that Europe is indebted for the great development of Christian art in architecture and textile designing. In this early era, the first half of the sixth century, a new epoch arose and a new style was inaugurated, and its influence, as I have just said, remained as a great artistic power until the thirteenth century.

Justinian introduced the cultivation of the silkworm or sericiculture into Europe from China, and was not slow to perceive the great importance of the art of silk weaving. He caused Imperial factories to be built, and engaged clever designers and weavers from Persia.

The influence of Persian ideas in Byzantine patterns is easy to see. The illustration fig. 2 shows a representation of two Persian Kings hunting lions. Among other subjects we find that of a man fighting with a lion—perhaps Hercules fighting the Nemæan lion; Samson slaying the lion, or a representation of Christian martyrs struggling with wild beasts in Rome. An illustration of the chariot races which were popular at Byzantium in the time of Justinian is to be seen in an example at the Cathedral of Aix-la-Chapelle. It consists of a figured centre, with a chariot drawn by four horses.

Fig. 3 represents a rare fabric from the Church of St. Mary, Dantzic. It contains an Arabian inscription, "assultan al alim," the wise sultan. This is a later fabric, and belongs to the time of the early Islam ascendancy.

Closely associated with Byzantine treatment is the Coptic weaving of the Christian Copts of Egypt, large collections of which have been exhumed from the ancient burial grounds of Sakkarah and Akhmim, in Upper Egypt, by Mr. Flinders Petrie. The patterning of these cloths is very varied and interesting, and dates from the fourth to the tenth centuries. It is remarkable that the dyes, chiefly red, blue, green, yellow, and purple, are so fast as to have scarcely changed their colour since their entombment, and what is particularly interesting, some of them bear evidence of careful maternal darning. The dead were evidently buried in their holiday garments. At Akhmim a printing block was discovered, carved in the pattern to be produced on the textile. The tissues, mostly in the form of tunics and other garments, date from the earliest centuries of our era down to the ninth or tenth.

Most likely Egypt was the centre of production of this printed work, whence it was for a long time distributed into Western Europe. Akhmim was for centuries celebrated for weaving woollen fabrics. A piece of fine linen printed in reserve, white circles on a blue ground, was found in the tomb of St. Cesarius of Arles—sixth century work. A piece of cotton cloth printed in red, gold, and black, representing Ganymede carried away by the eagle, was found in the Church of Quedlinbourg. Professor Lessing considers this piece to date from the sixth to the eighth centuries. We have also patterns of printed fabrics found in ancient France, Holland, Germany, Austria, and Italy—chiefly human figure subjects with birds, dragons, foliage, pomegranates, and later on, *fleur-de-lys*.

Next in order follow the interesting designs, both woven and printed, of Saracenic or Sicilian inspiration, which I shall explain at more length when I come to speak of St. Cuthbert's burial robe.

Fig. 4, a device of eagles, lions killing ducks, &c., is Sicilian, and is from a woven fabric in the Museum of the Weaving School, Crefeld. A lion seizing a duck pursued by an eagle means that the possessor of this garment was valiant enough to snatch the booty from the claws of the eagle, the eagle signifying luck and riches, the lion power and hunger.

Fig. 5 shows a beautiful decorative design; I am unacquainted with its meaning, but doubtless it has one. I have reproduced it as a print. In the design shown in Fig. 6 we see a lion and a hoopoe; it may be inferred that the fabric belonged to the robe of a strong and wise sovereign, since the hoopoe signifies wisdom. Moreover, a little inscription in the narrow border of the stuff says, "The Wise."

Fig. 7 is a crowded design, which shows a woman catching a hare with a net, and holding by a chain or cord a hound and a spotted cheetah. Beneath this we see a woman with an eagle. From Arabian symbolism we learn (says Professor Karabacek, of Vienna) that the catching of the hare signifies opulence, marriage, and increase of family. To dream of riding on an eagle's back foretells riches.

Fig. 8 is a reproduction of a design often used for ecclesiastical decoration. Two stags are fastened with chains lifting their eyes to heaven, kneeling. Dewdrops and sunbeams fall from the sun which is partly hidden by clouds. The stag is supposed to symbolise the soul weary of life and yearning for eternal rest, beautifully expressed in the forty-second Psalm—"As the hart pants after the water-brooks, so panteth my soul after Thee, O God."

In the treasury of the church at Maestricht there is kept a piece of stuff which belonged to the garment of St. Servatius, the patron of the church, in which he was buried. The figured part of this design is surrounded by connected circles having a diameter of a quarter of a yard. Within the circles two brothers stand upon a Doric column, perhaps Romulus and Remus, or the two Dioscuri, Castor and Pollux. On each side of the column a bull is being sacrificed. Two angels pour out a libation.

The symbolical meaning of these Sicilian designs is well exemplified in a design found on a cope from the church of St. Mary, Dantzie, and now partly in the South Kensington Museum. This shows the dog, the symbol of the human soul, freed from this mortal life, as indicated by the broken chain; the eagle, the symbol of Divinity, having descended from heaven to break the chain, steers the soul to the abode of the blessed, and this action takes place under the shade of the great and mighty tree of the church whose branches overspread the world. This design was probably made for the use of funerals. I have reproduced it as a print. It is a remarkably effective and interesting subject.

I have next to mention the white and coloured silk cloth vestments in which St. Cuthbert's body was wrapped A.D. 1100 when it was reburied in Durham Cathedral. The account of the original cloths is interesting. In the year 1104, Reginald, a monk of Durham, describing three robes in which the body of St. Cuthbert was clothed, says they were taken off, and describes the three robes by which they were replaced in his time. These last, he says were of a similar nature to those which were taken off, but of greater elegance.

The occasion of the re-clothing was the translation of St. Cuthbert's body to the tomb prepared for it in the magnificent new Cathedral of Durham. From A.D. 999 to 1093 it had lain in the Anglican Cathedral of Durham, and from 1093 to 1104 it lay in the temporary tomb prepared for it when they began to pull down the Anglican Cathedral to make way for the present Norman Church. Reginald says that the robe nearest the body in 1104 was "of silk, thin, and of most delicate texture;" the next he describes as "costly, of incomparable purple cloth;" the third or outermost was "of the finest linen." When the tomb was opened in 1827, they found first the linen robe and then portions of the two silk robes. One of these robes was of thinnish silk, the ground colour amber, the ornamental parts literally covered with leaf gold, and the fringe a braid of the same colour stitched on with a needle. The design shows a knight with hawk and hound, rabbits, &c. Another was a robe of thick, soft silk; the colour had been brilliant beyond measure. It is the urn or island pattern. The ground within the circle is red; the fruit and foliage yellow with red stalks; the urn or flower basket, the ducks, and the sea red, yellow, and purple; the porpoises yellow and red; and the pattern round the border of the robe red. These two correspond to the description by Reginald of the two robes placed next the body. The translation of the body having been contemplated for so many years, there was plenty of time for having special robes made. It is very tempting to believe that the urn represents Farne Island, blossoming with Christian virtues, and bearing abundance of Christian fruit; the fish and the water birds. Another robe shows St. Cuthbert's porpoises and eider ducks; the knight with hawk and hound, the great secular position of the Bishop of Durham—and so on.

St. Cuthbert's life was chiefly spent in the Monastery at Farne Island, and when he died his body was brought to Durham Cathedral. Up to the time of, and long after, his reburial, there was no silk-weaving in England, therefore the silk cloths must have been imported, and probably ordered, from abroad, the designs printed upon them being of Eastern character, mainly of Persian treatment. At that time, when the Normans conquered Northern Sicily, towards the end of the eleventh century, a flourishing school of Arab silk-weavers had been established there for more than a century. The Norman kings, who highly appreciated the beauty of these silken stuffs, granted special privileges to the Arab weavers, so that they continued to work their silk looms under the rule of the Christian conquerors; thus from the eleventh to the fourteenth century Palermo continued to be the chief centre for the production of woven and figured silk.

The products of these Sicilian looms were exported widely throughout Europe, especially for ecclesiastical vestments, frontals and dossals. The stuffs woven by these Siculo-Arab craftsmen were of two classes: 1st, the textiles woven before the Norman Conquest, 1080-1090; and 2nd, the textiles of the period when these Arab workmen were employed by their Norman conquerors.

In the second period the designs were of endless variety, and showed greater freedom than in the first period, in which the designing done (whether woven or printed) was more from purely Oriental motives, mostly of Persian origin—such as a warrior on horseback with a hawk on his wrist, attended by a hound.

The two chief pieces of printed silk which were used to re-enfold the body of St. Cuthbert in 1104 are valuable examples of the older class. One has the horseman, and the border is decorated with sham Arabic letters. The other, which Raine in his interesting work on the exhumation of St. Cuthbert, took to be a representation of Farne Island with its rabbits

and eider ducks, belongs to the semi-classical styles of pattern. This proves the antiquity of European tissue-printing although by Eastern workmen.

The artistic weaving of textiles spread from Palermo to Lucca in the middle of the thirteenth century, and after that to Milan, Florence, Bologna, Venice, and Genoa. The Saracenic styles gradually gave way to the more flowing and geometrical forms of the Renaissance in which the pomegranate became a leading type, and gradually, by the end of the fourteenth century, figures of animals disappeared totally.

Few of the world's fabrics of any age have been more celebrated than the old Genoese velvets and brocades and the rich fabrics from the looms of Florence and Venice. Italy became, and is also, a silk-growing country, the mulberry flourished there, and with it sericiculture was a certainty. The early Italian dyers practised the tradition of the further East, and with indigo for blue kermes and afterwards cochineal for red, gave them power in tinctorial application which made their coloured fabrics famous and permanent.

The permanency of their dyes and the beauty of their colourings gave them for centuries an enviable ascendency.

We now come to what may be called the Genoese velvet and Italian damask period, the period of the Renaissance and of the Italian painters.

Although Italy might have depended more for its Renaissance silk designs upon designers of the craft than upon painters, we know in how many instances painters and architects have excelled, and do still excel, in the decorative treatment of patterned work; and I believe such influence and work can be traced in the designs of some of the great Italian painters' pictures. Take, as an example, Carlo Crivelli, who painted in the middle and latter part of the fifteenth century. In his pictures we see elaborate designs in brocaded silk, indicative and typical of the conventional Venetian brocades and velvets of that time. The patterns he painted are all different in design, but there is a sameness and individuality of diaper treatment which makes me incline to the opinion that he was also a pattern designer for the Italian weavers and printers of those days. The patterns in the pictures of Fra Angelico and Paolo Veronese in the National Gallery are worth studying, being suggestive of earlier patterned treatment, as well as of influences in artistic design which operated for centuries later.

Mr. Sidney Vacher a few years ago did historical designing a great service by working out the designs of dress in the old pictures of Madonnas and saintly women in the National Gallery. I am indebted to his book for a few of them, and I think you will be of my opinion that these designs were Crivelli's own.

Fig. 9 is one of the fifteenth century which I have reproduced as a cotton velvet print.

Fig. 10 is from velvet, and of about the same age.

Fig. 11 is a beautiful Italian velvet design. The pomegranate is placed in the centre as a symbol of Christian love, and is surrounded by blossoms and fruit, "the whole being symbolically interpreted to mean that love, by the aid of faith, brings forth the fruit of everlasting life."

In the sixteenth and seventeenth centuries designs were in a transition state between the Italians and the later French schools. An example of this type is shown in fig. 12. The diminution in size of patterning was caused by the introduction of Spanish styles of dress throughout Europe. The narrow folds and slashings of the garments required small patterns, which often took the character of fleurs semées or strewn flowers.

In Germany at this period there was a taste for patterns printed in butchers' blue on a white ground on linen, used sometimes as cheap altar cloths. Fig. 13 is an eighteenth-century print of this kind, on cotton of unconventional fleurs semées.

From this time down to Louis Seize, pattern designing underwent a great change. It lost much of that conventional character, which is after all the charm and the necessity of a good pattern. We find introductions of naturalistic flowers and foliage; the pomegranate gave way to the flower vase, imitations of ribbons, lace, birds, quadrupeds, horns of plenty, fruit, baskets of flowers, and lastly, Chinese influences, pictorial representations of Scripture, and other subjects; architectural and *al fresco* scenes reaching into the eighteenth century and culminating in the time of Louis XVI. Among the subjects treated we find such as Mary Stuart quitting France; Joshua and Caleb returning from the Promised Land laden with grapes; or Arcadian subjects such as that shown in fig. 14.

In the latter part of the eighteenth century there was a celebrated calico printer named Oberkampt whose works were at Jouy in France.

We now come to the Empire period or the beginning of the nineteenth century. Fig. 15 is a specimen of a French print of a floral subject of this period.

From 1800 downwards we arrive at distressing decadence; artistic inspiration gave way to commonplace work by commonplace designers, and it is not until we come into what I call the Morrisian period of our own times, that pattern designing as a worthy art has reappeared.

But before I speak of this nineteenth century work, good and bad, chiefly bad, I will refer to some pictures of the designers of other countries, chiefly Eastern.

Fig. 16 is a copy from old Persian tiles I have printed on velvet. There is no doubt that printing has been carried on for many centuries in Persia, and has developed to a great extent. A curious thing is that their dye and print works are called "workshops of Christ." According to Persian tradition, Jesus was a dyer.

In Java and Sumatra the printing is done by drawing the design upon cloth with a very small copper kettle containing melted wax. Women generally do this work. They hold the cloth over one hand, and wax or paint in the design with a tiny kettle and its finely pointed spout or tube. Both sides of the cloth have to be waxed exactly alike. After the cloth has been waxed it is dyed, the waxed portions resisting the dye.

Spain was a country which early practised the printer's art. It was no doubt introduced by the artistic Moors, for it is known that in 1234 James I. of Spain issued an edict "estampados," meaning stamped issues. I have a specimen of Spanish printing giving a pictorial representation of the Apostle St. Santiago fighting on horseback; it is probably of the last century.

There is a word used in India to denote tie-and-dye work—"Bandhana," from the Hindoo word "bhanda," to tie. This work is extensively practised in India, particularly in Jeypore and Ulwar. It was the precursor of printing in the silk handkerchief trade in Calcutta and Bherempur, and is a very remarkable means of producing designs in spots, round, oval, or square, and plaids. Previous to dyeing the cloth, certain parts are tightly tied in a pattern work of wonderful ingenuity requiring much patience.

At Baroda I bought a very curious example of what we in England call warp or chine printing—*i.e.*, the warp is printed in pattern before weaving. In this Baroda wedding-robe, however, the geometrical effort is produced by first tieing and dyeing the warp and the weft, and then weaving the fabric. It is also a wonderful example of patience and skill, and is as costly as beautiful. The fabric is among the present collection.

Some of the Hindoo brocades woven in Surat are beautiful specimens of Mahommedan work. They are made for rich Arabian merchants.

A series of patterns cut upon very old blocks were given to me in Calcutta in 1886 by a Mahommedan bandhana silk printer. They represent the typical pattern-designing of India. The blocks are very small; some of them are four hundred years old. It is easy to recognise among them many of the patterns which have for so long been printed in Lancashire for cotton dress purposes, derived, without doubt, from ancient Calicut designs like these.

The diapers and pine or cone patterns predominate in all Indian ornament; the diaper treatment for centres and the pine or cone for borders.

Among the most artistic and beautiful designs the world has seen are the frescoes in the Caves of Ajunta in Bombay. The decorative treatment is Bhuddistic, and dates from about two thousand years ago. Since I returned from India I reproduced one of them (Fig. 17) by the help of Mr. Purdon Clark, the present Director of the South Kensington Museum. It represents the traditional ripe pomegranate fruit being pecked by conventional peacock or other birds. As an example of graceful artistic conventional decorative treatment I have not seen any designs to surpass it.

Native craftsmen in India do not change their craft, their methods, and rarely their patterns. I was frequently told that their forefathers had done the same work from time immemorial. Their favourite way of putting it was:—"My ancestors have worked at this for a thousand years." The love of pattern, ornament, and colours seems to be a part of their nature and to be almost intuitive, although beautifully wrought. Dyeing and printing are two of the great crafts of India. Perhaps you will allow me to tell you a story on the subject, and to relate an incident confirmatory of that story. I have just spoken about the traditional unchangeableness of the craftsmen of India. This is well illustrated in the story of Aboo-Seer and Aboo-Keer, related in Lane's edition of the "Arabian Nights Entertainments," from which I will quote, and which received amusing confirmation in my experience when at Peshawur:—"Aboo-Keer was a dyer, who, with his friend Aboo-Seer, a barber, set out from their native place to see other cities. They came to one city at which Aboo-Keer betook himself to the market, and clad himself in costly robes, and proceeded to go about the city and divert himself. He saw it to be a city of which he had not found the like among cities; but all the apparel of its inhabitants was white and blue, without any other colour, and he came to a dyer, and saw that all that was in his shop to be blue; and producing to him a handkerchief, Aboo-Keer said to him "Oh, master, take this handkerchief and dye it, and receive thy pay.' The dyer replied, 'The pay for dyeing this will be twenty pieces of silver.' So Aboo-Keer said to him, 'We should dye this in our country for two pieces of silver.' The man rejoined, 'Go dye it in your country; but as for me I will not dye it save for twenty pieces of silver; the pay will not fall short of this sum in the least.' Upon this Aboo-Keer said to him, 'What colour dost thou desire to dye it?' The dyer answered him, 'I will dye it blue.' Aboo-Keer said to him, 'I desire that thou shouldst dye it for me red.' The man, however, replied, 'I do not know how to dye red.' Aboo-Keer said, 'Green.' The dyer, however, replied, 'I do not know how to dye green.' Aboo-Keer said 'Yellow.' The dyer replied, 'I do not know how to dye yellow.' And Aboo-Keer proceeded to enumerate to him the colours one after another, but the dyer replied, 'We in our country are forty masters, not one more nor one less; and when one of us dieth we teach his son, and if he leaves not a son we are deficient by one. When one leaveth two sons we teach one of them; and if he die we teach his brother. Thus our trade is strictly regulated and we do not know how to dye any colour except blue alone.' So Aboo-Keer the dyer said to him, 'Know that I am a dyer, and I know how to dye all colours. I desire that thou wouldst take me into thy service for pay, and I will teach thee the art of dyeing all colours, that thou mayest glory therein over all the company of dyers.' But he replied, 'We allow not a stranger to enter our trades ever.'"

This story was called to my remembrance when I was passing through the bazaars at Peshawar, escorted by an armed sergeant of police, provided for me by the then Resident, Col. Nisbet, as my interpreter and bodyguard (a necessary precaution in that Khyber Pass and Afridi region). I was particularly struck with the blue-dyeing workshops, and curiosity prompted me to repeat the request of Aboo-Keer, and to try if I could get a piece of cloth dyed any other colour than blue. So I bought a short piece of bleached English cotton at a bazaar close by, and took it to one of the dyers and told my interpreter to ask the dyer to dye it red for me. The dyer said, "Tell the Sahib I will dye it for him blue." I replied that I did not want blue, but any other colour, preferably red. The man replied, "Tell the Sahib I only dye blue, and I do not know how to dye red." I replied to my interpreter, "Tell him I am a dyer also, and know how to dye all colours, and I will teach him how to dye red, or green, or yellow." The dyer made a very respectful salaam, but said very firmly, "Tell the Sahib that I and my forefathers have dyed blue for thousands of years, and that I will dye it only blue." No money inducements nor the promised information of the processes of dyeing other colours were of any avail, and so I brought my two yards of white calico to England undyed—an amusing verification of the "Arabian Nights"

story, said to have been written two thousand years ago, and an instance of the unchangeable tradition and practice of arts and crafts in India. And so it is, not only with their caste craftsmanship, but in their patterns also—practically no development in form or colouring.

Designing for the Church, for furniture or upholstery, and for personal decoration, have been the three important divisions or uses of pattern work from the earlier times. By the Church I mean all religions and their consequent symbolic expression; and I think I am safe in asserting that the decorative and artistic teaching of religious themes and dogmas holds the highest and most important place; at least, we have seen that it was so in India, in Egypt, and in Europe in the earlier times. The reason of this is not far to seek. All religious beliefs have always had an outward expression, and it was customary for many centuries, and ought to be so still, to offer to God the best, both of art and of all human effort. Witness, as a wonderful example, the products of Gothic art, whether in cathedrals or churches, and their adornment by the best painters and artists in glass, in mosaic, in woven and printed hangings of the greatest possible glory and beauty, in embroidery, in gold, silver, brass, and laten work.

Of the designers, history records that the best painters at one time were also textile printers. This was the case in both Germany and Italy. After the Renaissance, pattern-designing slowly and gradually deteriorated, and grew more and more unmeaning, until, in the last century and down to the first half of this, it had become a mere language of flowers, and patterns of the most unmeaning and frivolous description. In no domain of art is this more conspicuous than in calico-printing. I defy any one to look over the Lancashire printer's pattern books of, say, 1800 to 1850 without feeling that artistic design had been dethroned, and in its place coloured patterned treatments had become the order of the day, which were productions of men who for the most part were unable to draw or to conceive an artistic subject, and in the art of colouring displayed the greatest ignorance. English calico-printing owes much to Indian patterns, although deprived of the meanings which generally attach to them there. In this respect the patterns are good, but when the designers were left to their own resources the results were generally inartistic and on the wrong side. This rule, however, was not without its important exceptions, just as Wedgwood in pottery outshone his contemporaries. There are notable examples to be found in English printing of the earlier part of this century of better designing and of good colouring particularly for furniture and upholstery work.

Let us now consider the improvements that have taken in the latter half of this century. In the first place, we must freely acknowledge the influence and teaching of the Science and Art Department at South Kensington in training teachers for the numerous schools of art in the kingdom, well fitted for their work in teaching drawing, and, to some other extent, design. I am one of those who regret that the word "Design" was omitted in describing the schools of art, because I have often noticed that design is successfully taught, particularly in cases where the students possess some sort of faculty for the work, just as knowledge of colouring—a most difficult thing to acquire—can be and is imparted. The state of both design and colouring is much more healthy than ever before in this country, and I believe from the preference frequently given for English decorative work in both wall-papers and printed textiles on the Continent that we are assuming, if we have not already achieved, the leading position in these matters.

Let me refer to the influence of my late friend, William Morris, a really very great man in whatever department of art you consider him, whether the art of poesy or of ornament. His power, partly intuitive, but mainly acquired by study of olden artistic work in form and colouring, was amazing. I have never met any one who could approach him. The slightest departure from colour harmony jarred upon his mind and eye like an unresolved discord on the ear. The pains he took to get his colouring right were immense, as were his powers of resolve and work. I should have known but little of printing but for him. After his success in his beautiful wall-paper designing, he appealed to me to join him in an attempt at improving the art of tissue-printing, chiefly for cretonne purposes. Rather rashly, I think, I undertook the task, being led on by the charm of his personality and the wide range and power of his artistic ability. He limited me, however, to the most difficult conditions, which may be summed up in a few words—a revival of all the old (and, for the most part, discontinued) processes of producing and applying colour, and an absolute avoidance of all artificial dyes. All the old books of the last four centuries had to be rummaged up, whether Italian, French, or English. The Indian methods had to be studied by myself on the spot, and not only the research but the application of such knowledge presented difficulties such as I should not like again to encounter. I have his first design (Marygold) for cotton cloth, which for simplicity and beautiful drawing I think he never excelled. I have also a few others of his designing, among which is one which has had a marvellous hold on public taste, and which is yet far from being abandoned—I mean his Honeysuckle design, which up to two years ago had been continuously printed on my tables for more than twenty years, showing a vitality only possessed by patterning, as with painting, of the highest order.* Fig. 18 shows one of his designs of this type.

Following in his train are other worthy workers in the craft, amongst whom I have selected a few whose designs bear ample evidence of the long-needed revival of healthy and able decorative patterned work.

Fig. 19 is the work of Mr. Reuter, formerly a designer of tiles at Minton's Staffordshire pottery. I think you will agree with me that it is an admirable treatment of flat patterning.

I have also some admirable designs by Mr. Lethaby, by my late friend, John Sedding, and two by the late Duchess of Teck, who took so great an interest in the silk industry.

Fig. 20 is a design by my youngest son, who has been trained to this work.

At this point I would mention also the fabrics by three manufacturers who have lent me specimens of their work. First and foremost are the beautiful brocades, brocatelles, and damasks of Messrs. Warner & Sons, of Spitalfields and Braintree, whose pre-eminence in everything that relates to ornamental weaving art is well known and accepted. I have served on the Jury in the Silk Section at the two last International Paris Exhibitions, and I can assert, without fear of contradiction, that there were no silks produced in France to surpass them, or in many cases to equal them. The next are those lent by Mr. George Bermingham, of Leek, who for many years has devoted his attention to the artistic side of weaving brocades, damasks, and silks for dress. The third series are those from Messrs. Alexander Morton & Co., of Darvel, Ayrshire, which are also very artistic productions.

I wish to acknowledge my indebtedness to Herr Schulze's "History of Pattern Designing," and also to Herr Forrer, from whose works I have freely quoted.

In modern work the designs on wall papers and on textiles, the beautiful tapestry of Morris, and the painted glass designed by Burne-Jones are among the finest productions of decorative work for public buildings of either ancient and modern times. We are rapidly improving, but it is not only in the home that one sighs for improvement; in street decorations one sees unbounded possibilities, both in architectural design and colouring. Then, again, there are the forbidding cold and colourless interior of our churches, chapels, and public buildings—the true arenas for artistic decorative treatment — and capabilities, far more important than the best canvas pictures ever painted—churches with their cold grey stone walls, so unedifying and comfortless that even white-washed walls are a relief! Now, mural painting and mosaic in such buildings are slowly, but happily, becoming a necessity; they nobly repay the cost, for, first of all, our places of worship surely need it most. Our narrow insular prejudices have too long banished art from their dreary interiors, but happily all that is changing, and patterned beauty, instinct with meaning, is gradually driving back prejudice and ugliness. Many houses in the land possess beautifully-arranged interiors. But the houses of the poorest can be beautiful, and the elevation of taste is the elevation of life. Matthew Arnold wrote, "In art there's truth; take refuge there." Those of us who cannot afford costly art at home can and ought to say, "Let our places of assembly be made as beautiful as collective cost and art applied can make them." There is no better investment for public money. Then we must have art galleries and museums in each and every centre of population, as well as periodical exhibitions of contemporary art-work to elevate and encourage workers and the public in their leisure moments. The mind in its search for happiness must ever seek to triumph over matter, and so reveal the beauties which lie hidden there.

> In the still air the music lies unheard;
> In the rough marble beauty lies unseen;
> To wake the music and the beauty needs
> The master's touch, the sculptor's chisel keen.

[For some notes of the interesting discussion which followed, see our last issue, page 505.]

* Four examples of textiles designed by Morris, which were exhibited at the lecture, will be given among the illustrations in our next issue.

MAGAZINES AND REVIEWS.

The *Architectural Record* (New York) for October contains two articles of more than ordinary interest. One is on the Capitol of New York State, the general outline of which is that of a French Hôtel de Ville, but the interior details, over which Richardson, among other architects, had influence, are very superior in interest to most modern French detail; the specimens of carved work illustrated are admirable, and moreover have what may be recognised as a distinctly American character. The other article referred to is that of Mr. Russell Sturgis on "Stone in American Architecture," partly suggested by the fact that (as stated by the author) there is at present a great movement in favour of a return to stone building in the States. We cannot sympathise with all the remarks as to the treatment of masonry; the Americans seem to us to be at present much too fond of strongly rusticated masonry; but there are a good many suggestive hints in the article, and some interesting information as to American building stones.

The *Art Journal* is not a very interesting number this month. The article on "The Great Cats in Sculpture and Painting," by Miss L. B. Thompson, if it is the commencement of a series, promises well, and the subject is an interesting one, starting from the lions of the Mycenæ gate, to come down, we presume, to the present day. The frontispiece is a reproduction of Cousins's engraving of Lord Leighton's "Moretta."

The *Architectural Review* (Boston), No. 10 of Vol. VI., contains among its illustrations some competition designs for "The first Parish Church, Cambridge, Massachusetts;" one of them, by Messrs. Chase and Ames, a late English Classic design which might be by Gibbs or Flitcroft, the two others orthodox Gothic shown in very effective drawings. It is curious to see those opposing English types still battling it across the Atlantic. Messrs. Herts & Tallant's design for a ballroom, a narrow upright sketch in perspective, is a brilliant bit of work in very florid taste. The article on "Good and Bad Modern Gothic," by Mr. R. Adams Crane, is very pointedly illustrated by a series of illustrations in pairs, each pair presenting a contrast of good and bad, and we must say that we agree with the differentiation in all the cases illustrated.

The *Studio* (November 15) contains an article on Henner; we do not think the illustrations selected exhibit Henner's best powers in the poetic treatment of the nude figure, except perhaps the plate of the Magdalen; and in fact Henner himself, in his own paintings, unfortunately does not exhibit his best powers now; they belong to the past. Mr. F. L. Emanuel's series of street sketches in pencil, of which some reproductions are given, are very good examples of free architectural sketching.

The *Genealogical Magazine* includes an illustration and description of the new heraldic memorial window in the Town Hall at Kingston-on-Thames, executed by Messrs. Heaton, Butler, & Bayne, of which we may say that though the details of the heraldic shields and emblems may be well designed (of which one cannot judge from the comparatively small illustration given), the whole placing and arrangement of them in the window is singularly devoid of decorative effect.

In the *Antiquary* Mr. Feasey continues his essay on "Curiosities of and in our Ancient Churches," giving some interesting records as to hearse-houses, sundials, clocks, and

other subjects in connexion with ancient churches.

In the *Berliner Architektur-Welt* the frontispiece, showing a block of artisans' dwellings at Berlin, by Herr Messel, exhibits a much more restrained and reasonable style of architecture than is usually seen in modern German street buildings. German Gothic is shown in all its nakedness in an illustration of the Catholic Ludwigskirche, by Herr Menken, which looks as if it were the product of a box of bricks "made in Germany." Some sketches of architectural schemes by Herr Fritz Gottlob, especially the two showing architecture in connexion with water—a bridge with towers, and a "Burg am Wasser," or castle by the sea, are very effective.

In the *Architects and Builders' Magazine* (New York) an article on "Some Bermuda Buildings," by Mr. A. J. Bloor, illustrates a rather out-of-the-way chapter of modern architecture.

The *Fortnightly Review* contains an article signed Julian Moore, with the title "A Lost Principle of Beauty in Architecture," which turns out to be nothing more than the theory about curved lines and irregular setting-out of everything, including arguments and information as old as the hills to architectural readers, here solemnly set before the public as a novelty.

Scribner, under the heading of "The Field of Art," has an enthusiastic article on the sculptures of the Dewey reception at New York. Part of the show appears to have been a monumental arch which is certainly, judging from the illustrations, superior to most temporary erections of the kind, and shows the desire to celebrate the occasion in an artistic spirit; but the capacity of writers in American magazines for blowing trumpets over every work of an American artist seems here to be even more rampant than usual. A series of line-drawings by Mr. Gibson, illustrating "The Seven Ages of American Woman," is, as might be expected, excellent.

In the *Century* Mr. Timothy Cole does not appear to so much advantage in his engraving after Lawrence's "Lady Derby" as in his translation of those works in which landscape predominates more, though the handling of some portions of the costume shows excellent treatment of line-engraving. The number contains a half-length illustration of the figure of Washington by an American sculptor (Mr. D. Chester French) which is to be presented to Paris by an association of American women; it is a fine spirited head, but, judging by portraits of the period, seems to refine on Washington's actual physiognomy rather. The number opens with a page containing a decorative framework of Renaissance design enclosing a sonnet by "F. B. F.," called "The Old Master," and containing a very happy characterisation of the practice of the early Renaissance painters of illustrating scenes and personages in sacred history from the familiar figures around them, which, as a poetic *résumé* of the artistic position, is worth quoting :—

"Of his dear Lord he painted all the life,
But not that ancient land, nor the old days;
Not curious he to seek through learned strife
The look of those far times and unknown ways.
But in his solemn and long-living art
Well did he paint that which can never die,
The life and passion of the human heart
Unchanged through time that was and is to be.
Beneath his brush his own loved people grew,
Their rivers and their mountains, saints and lords,
The dark Italian mothers whom he knew,
The sad-eyed nuns, the warriors with drawn swords;
And the young Saviour, throned at Mary's breast,
Was but some little child whom he loved best."

The *Pall Mall Magazine* includes a valuable article on "Turner Prints," by Mr. Wedmore.

We have received also *Harper*, the *Gentlemen's Magazine*, the *Quarry*, *Knowledge*, and the *Indian Engineer*.

WESLEYAN MISSION HALL, YORK.—Foundation stones of a Wesleyan Mission Hall, which is being erected at the corner of Skeldergate and Queen's Staith road, York, were laid on the 22nd ult. The building will measure about 50 ft. by 60 ft. On the ground floor there will be a school-room with class-rooms opening from it, and upstairs a large hall with accommodation for 300 persons. The contractors are Messrs. W. Birch & Son, bricklayers; Mr. John Plows, mason; and Mr. W. Usher, joiner. The architects are Messrs. Hornsey & Monkman. The main entrance will be at the corner of Queen's Staith-road. The estimated cost is 2,500*l*.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE third general meeting (business and ordinary) of the Royal Institute of British Architects, for session 1899-1900, was held on Monday at No. 9, Conduit-street, the President, Mr. W. Emerson, presiding.

The minutes of the last meeting having been read and confirmed, the results of the November examinations—Preliminary, Intermediate, and Final—were announced as follows :—

Preliminary examinations, qualifying for registration as *Probationer*, were held simultaneously in London, Birmingham, Bristol, Cardiff, Dublin, Manchester, and York on the 7th and 8th ult. Of the 154 candidates admitted, claims for exemption from sitting were allowed to the number of thirty-four. The remaining 120 were examined, with the following results :—

	Examined.	Passed.	Relegated.
London	70	33	37
Birmingham	7	4	3
Bristol	7	4	3
Cardiff	7	3	4
Dublin	2	1	1
Manchester	14	8	6
York	13	10	3
	120	63	57

The successful candidates, together with those exempted, making a total of ninety-seven newly-registered probationers, are as follows:—G. N. Beaumont, Wakefield; P. R. Berry, Wandsworth-common, S.W.; H. R. Bird, London; H. T. Bowell, Stoneygate, Leicester; G. R. Bower, Wentworth, near Rotherham; M. S. Briggs, Otley; W. E. Brown, London; H. P. Buckingham, London; E. H. Bullock, Eastbourne; C. F. Burton, West Hartlepool; H. Byron, London; A. J. P. Carrington, London; E. L. Cashmore, Edgbaston. Birmingham; N. S. Chedburn, Aberdeen; O. H. Cockrill, Great Yarmouth; W. J. C. Coulson, Gateshead-on-Tyne; A. R. Crisford, Eastbourne; T. T. Cumming, Reading; R. S. Dacombe, Southampton; E. A. Dakin, Long Whatton, Loughborough; A. F. H. Daniel, Henbury, near Bristol; W. Davidson, Edinburgh; T. E. Davies, Anfield, Liverpool; A. Dicken, Ealing, W.; H. Dru Drury, Blackheath, S.E.; C. C. Duggan, London; R. K. Ellison, Carleton, near Skipton; J. P. Firth, Wakefield; A. W. Fletcher, Manchester; Sir Francis C. R. Ford, Bart., Burley-in-Wharfedale, Leeds; A. Gilpin, Chippenham; G. R. Griffith, Trefnant, R.S.O., Denbighshire; E. L. Hampshire, London; T. Hanson, Newcastle-upon-Tyney W. Haywood, Birmingham; S. T. Hennell Wandsworth; T. H. Hill, Altrincham; W. H. Hillyer, Catford, S.E.; G. S. Hoffmann, B.A. Cantab., Putney; G. Holmes, Roundhay, Leeds; G. L. Hudson, Bradford; M. Idle, Clapham, S.W.; E. A. Jackson, Great Yarmouth; W. B. Jemmett, Tonbridge; N. Jewson, South Lowestoft; F. G. Johnson, Neath, South Wales; J. T. Johnstone, London; H. W. Kefford, Tottenham; F. W. Longman, Notting Hill, W.; L. Leeper, Great Yarmouth; J. Lees, Altrincham; H. M. Lewis, Wokingham; P. S. Little, Leeds; B. M. Lloyd, Birmingham; F. J. Lucas, Southampton; W. H. Ludlow, Reading; A. G. Maitland, Tain, Ross-shire, N.B.; H. J. Manchip, Canonbury, N.; E. J. Martin, London; F. P. Martin, Manor Park, Essex; J. Martland, Lathom, Ormskirk; C. J. M. Mason, Wigston Magna, near Leicester; O. P. Milne, Bedford; H. A. Moon, Brixton, S.W.; L. T. Moore, Great Yarmouth; E. B. Muff, London; P. C. Newcombe, Gosforth, Newcastle-upon-Tyne; C. E. Okely, London; S. H. Penlington, Barry Dock, Cardiff; J. Petter, Roath, Cardiff; E. Procter, Brockley, S.E.; E. Quail, Banbury, Oxon; H. C. Quérée, Chiswick, W.; S. C. Ramsey, Sutton; H. Rigg, Lancaster; F. A. Rogers, Stroud Green, N.; G. W. Rogers, London; T. J. Rushton, Ranelagh, Dublin; S. Searle, Ealing, W.; G. M. Seels, Newark, Notts; H. F. Sharp, Queensbury, near Bradford: W. C. Short, Taunton; J. M. Smith, Edinburgh; R. G. Spiller, Taunton; H. B. Squire, Maida Vale, W.; W. Steel, Sunderland; A. F. V. Stephenson, Aberdeen; G. W. Stokes, Cheadle Hulme, near Stockport; F. J. Strudwick, Ewell, Surrey; W. J. M. Thomasson, Worcester; E. H. Walker, North Finchley, N.; A. F. Warth, Mosely, Birmingham; C. S. O. Watson, Newcastle-upon-Tyne; A. F. Wickenden, Tunbridge Wells; F. W. Williams, Wallington, Surrey; W. F. Wills, Derby; J. G. Wilson, Maida Vale, W.

Intermediate examinations of candidates for registration as student were held simultaneously in London, Birmingham, Bristol, Manchester, and York on the 7th, 8th, and 9th ult. In all sixty-five candidates were examined, with the following results :—

	Examined.	Passed.	Relegated.
London	40	22	18
Birmingham	5	4	1
Bristol	3	0	3
Manchester	10	5	5
York	7	4	3
	65	35	30

The successful candidates, who have been entered on the Register of Students R.I.B.A., are as follows, the names being given in order of merit :—H. Chapman, jun., Westoe, South Shields; G. L. Russell, London; C. W. Beaumont, London; E. D. Brown, Hastings; C. A. Broadhead, Nottingham; W. H. Swann, Nottingham; J. P. Hall, London; E. G. Besant, Cambridge; R. Berrill, Edgbaston, Birmingham; C. V. T. Hodgson, Harpenden, Herts; C. E. Varndell, London; E. L. Wratten, Croydon; E. M. Joseph, London; G. H. Onions, West Bromwich; W. J. Nash, Wakefield; J. J. Wood, Leeds; C. M. Childs, London; W. C. Oman, Finsbury Park. N.; S. Towse, Catford, S.E.; R. P. Blakey, Sunderland; S. G. Hewitt, Liverpool; A. J. Mays, Lincoln; P. S. Widdup, Blackburn; A. Symons, London; G. F. Ely, Disley, Cheshire; H. T. Bill, Handsworth, Birmingham; A. R. Conder, London; W. E. Couch, London; T. Gregg, London; L. A. Jones, London; L. Lee, London; R. McM. Roberts, Latchford, Warrington; D. West, Ryde, Isle of Wight; F. C. W. Wheeler, London; C. Woodward, London.

Final and Special Examinations, qualifying for candidature as Associate R.I.B.A., were held in London from the 17th to the 23rd ult. Of the forty-seven candidates examined, the following twenty-two passed; and, subject to Section 8 of the Charter, have become eligible for candidature as Associates :—

F. H. Allen, Kettering; W. H. Ansell, London; S. E. Barrow, Lancaster; F. W. A. Buckell, London; T. J. Byrne, London; Bessie Ada Charles, London; D. McL. Craik, London; A. H. Foster, London; F. Foster, London; S. H. Hamp, Wembley; J. H. W. Hickton, Walsall; M. Honan, Liverpool; H. E. Illingworth, Mount Randon, near Leeds; A. R. Keighley, New Brighton, Cheshire; T. A. Moodie, London; J. E. C. Shield, London; J. E. Spain, Wragley, Lincolnshire; R. H. Spalding, London; F. Taylor, Aylesbury; R. Traquair, London; T. Tyrwhitt, London; H. Watts, Plymouth.

The following gentlemen were then elected to membership, viz. :—As *Fellows:* F. W. Bedford, Headingley, Leeds; J. Garry, West Hartlepool; J. Gunton, London; E. J. Lowther, London; R. F. Macdonald, London; H. Read, London; T. Taliesin Rees, Birkenhead; F. W. Troup, London. As *Associates:* R. T. Barker, London; H. T. Bromley, London; H. H. Dunstall, Chatham; H. E. Gilford, Purley, Surrey; C. Hale, Wellingborough; J. Hunt, London; G. E. Kendall, Humberstone, near Leicester; T. G. Lucas, London; H. A. Neubronner, Penang, Straits Settlements; W. G. Ross, London; W. M. Settle, Walney, Barrow-in-Furness; T. Sharpe, Manchester; V. Steadman, Bristol; H. F. Traylen, Leicester; T. H. H. Vowles, Oldham; P. J. Warman, London. As *Hon. Associate:* The Rev. John William Robbins, M.A., Oxford.

The meeting then terminated.

The next meeting will be held on the 18th inst., when a paper on the "Buildings of the French Exhibition of 1900," by M. Ch. Lucas, will be read.

LONDON GAS SUPPLY.—Adverting to our recent "Note," page 457, *ante*, we find that the London County Council's Bill will contain clauses relating to the additional testing at any place in their districts of gas supplied within the county by the Gas Light and Coke, Commercial Gas, and South Metropolitan Gas Companies, and the use of a portable photometer; the Bill provides that the Council shall prescribe the apparatus to be employed for testing, or that either the Board of Trade or the gas referees shall make regulations in that behalf, and that any of the companies shall be liable to penalty or forfeiture in respect of gas found to have less than the prescribed illuminating power. Other causes limit the charges for meters, stoves, and fittings, supplied by the companies and for slot and automatical meters, require that consumers shall be furnished with statements as to charges and their items, and make provision for the fixing and authorising of standard fittings, stoves, and meters to be supplied by the companies.

THE MAIN DRAINAGE OF LONDON.

At the meeting of the London County Council on Tuesday, the Main Drainage Committee submitted a report as to the main drainage of London, and as to the need of additional outfall sewers. The following is the greater part of the report:—

"For a long time past serious complaints have been made of the insufficiency of the main sewers in various parts of London, and our attention has frequently been directed to the dangers arising to public health from the periodical flooding of dwelling houses and other buildings with storm waters and sewage. . . . . The success which has followed the Council's operations in the past in improving portions of the sewerage system at a capital cost of about 1,143,402*l.* during the ten years ended March 31 last, is a fact on which, we venture to think, the Council may well congratulate itself; but after taking into consideration the conditions under which the main drainage system was established, and the work which it is now called upon to perform . . . . we have come to the conclusion that the time has arrived when a very heavy expenditure must be incurred by the Council in providing more sewer accommodation. The present system was established about forty years ago, and in view of the remarkable growth of London, and the gradual conversion into streets and paved surfaces of what had before been pervious soil, it seems to us that the Council should without delay undertake works of an extensive character to cope with present and prospective requirements. . . . . Up to the year 1815 it was penal to discharge sewage or other offensive matters into the streams or the old natural watercourses. Cesspools were regarded as the proper receptacles for house drainage, and the streams as the legitimate channels for carrying off the surface waters only. As population increased the old system had to be superseded, and in the year 1847 the first Act was obtained making it compulsory to drain houses into the streams which discharged directly into the Thames. These open streams gradually became polluted, and covered brick channels were necessarily substituted for them. The drainage of London was thus effected by means of sewers running in a general direction at right angles to the river, which as time went on became more and more polluted. This state of affairs gave rise to such serious complaints that, after several Commissions had failed to come to any practical result in effecting a solution of the difficulty, the Metropolitan Board of Works was formed with the object of preventing the sewage from entering the Thames in its passage through London as one of its principal duties. Shortly afterwards, a scheme for the drainage of London was prepared by the Board's Engineer, the late Sir Joseph Bazalgette, and adopted by the Board.

The objects sought to be attained by Sir Joseph Bazalgette's scheme were the interception and the discharge, as far as practicable by gravitation, of the sewage together with so much of the rainfall mixed with it as could be reasonably dealt with, and its conveyance to points of discharge at some distance down the river below London; the substitution of a constant instead of an intermittent flow in the sewers; the abolition of stagnant and tide-locked sewers, with their consequent accumulation of deposited matter; and the substitution of deeper and better sewers, with improved falls and pumping stations, especially in districts which owing to their low level were imperfectly drained.

To effect the object of preventing the discharge into the Thames three main sewers were constructed parallel to it to intercept the sewage flowing into it on the north side, and these are termed respectively the high-level, the middle-level, and the low-level sewers. The high and middle-level sewers discharge by gravitation, but the low-level can only discharge by the aid of pumping. The high-level and middle-level sewers form a junction at Old Ford, and thence run parallel as far as the Abbey Mills pumping-station, where they meet the low-level sewer, the contents of which are pumped to a height of 36 ft., having previously been lifted about 18 ft. at the Western pumping-station in Pimlico. From the former station the aggregate stream of sewage flows through the three 9-ft. outfall sewers, which are carried on a concrete embankment or brick viaduct across the marshes to the Barking outfall, where, since the year 1889, it has undergone chemical precipitation. On the south side of the Thames a similar system was adopted, and the intercepting sewers unite at the Deptford pumping-station, where the sewage from the low-level sewer is pumped to a height of 18 ft. The united streams of sewage then flow in one underground channel for a distance of nearly eight miles to Crossness, where they are pumped before passing into the precipitation channels. The sewage has been chemically treated here since June, 1892. The main intercepting sewers could not for obvious reasons be made of a size sufficiently large to take away all the storm-water, and provision was therefore made for exceptional storms by constructing overflow weirs at the junctions of the intercepting sewers with the old main valley sewers. These valley sewers again have outlets into the Thames, so that in times of heavy rainfall discharges into the river take place to a considerable extent. In consequence of the increase of population and the greater use of water to meet modern sanitary requirements, the accommodation in the sewers available for rain-water has been largely reduced, and the average dry weather flow is so large as to cause overflows into the Thames with an amount of rainfall very much less than was the case when the sewers were first constructed, and as the population continues to increase, the intercepting sewers will in some cases run so full that there may be overflows into the Thames even in dry weather. It is, of course, quite impracticable to make the intercepting sewers sufficient to cope with heavy falls of rain, which must of necessity pass direct into the Thames through the forty-four storm-water outlets, but it may be pointed out that as the sewage is diluted to a comparatively small extent after a slight rainfall, every effort should be made to prevent at such times any discharges, as they are then of a very foul character. For the purpose of providing more accommodation for storm-waters and conveying them into the Thames more quickly, large relief sewers have been constructed from time to time, and while it may be argued that sewage should, as far as possible, be taken to the outfall works and storm-water to the river, still the fact remains, and must be recognised, that the general features of the main drainage system have been unalterably settled, and that it is impossible, so far as almost the whole of London is concerned, to separate the rain-water from the house drainage. As the existing sewers are incapable of performing all the work the main drainage system may reasonably be expected to do, and as additional sewers are admitted to be required for the relief of local floodings, the proper course to take would appear to us to be that such sewers should be made to convey the drainage eastwards outside the county rather than into the Thames as it flows through London, especially as the areas affected in times of rainfall are not confined to the low-lying districts within a short distance of the river. The advantages gained by the expenditure of about 150,000*l.* annually in the treatment and disposal of the sewage of London at the outfalls, with a view to freeing the Thames from pollution, would also seem to be largely neutralised if every effort be not made to prevent undue contamination of the river with sewage at points higher up. . . .

In accordance with a resolution of the Council in December, 1889, Sir Benjamin Baker and Sir Alexander Binnie made a thorough and careful inquiry on the subject, and their joint report, dated February 19, 1891, was in due course laid before the Council. This report deals with (1) the present condition of the main drainage system on both sides of the river; (2) the chemical treatment of sewage, then just inaugurated at Barking; (3) the condition of the river Thames; (4) the new works necessary in order to bring the existing main drainage system up to present requirements, and to provide for future increase; and (5) the question of new outfalls, either at Maplin Sands or in Sea Reach. The engineers pointed out that the discharge of sewage into the sea on the Maplin Sands would probably entail an expenditure of eight millions in capital and an annual charge of 80,000*l.*, and that to take the effluent flowing from the north side of the Thames to Shell Haven at the top of Sea Reach would very likely cost about 1,600,000*l.*, with a probable addition of 40,000*l.* if a portion of the sewage from the south side were carried also to Sea Reach, together with an annual expenditure of 50,000*l.* in maintenance. They strongly advised that the mode of treatment by chemical precipitation at Barking and Crossness should be carried to completion before any further expenditure was incurred in removing the outfalls to more distant sites; and they expressed the opinion, which has been more than confirmed by subsequent experience, that the discharge of properly clarified effluent into the Thames at Barking and Crossness would be attended with the most beneficial results. As regards the works necessary to make the present main drainage system more effective, and to further reduce the pollution of the river, they reported that the works as originally designed had become overtaxed on account of the increase of population, and that the storm outlets into the Thames were brought into operation whenever the rainfall amounted to one-tenth of an inch. It was also pointed out by them that the two main outfall sewers from Old Ford to Abbey Mills were incapable of receiving the full quantity brought to them by the high and middle-level sewers, and that the discharging power of these two outfall sewers, with that of the low-level sewer, exceeded the capacity of the three large outfall sewers into which they poured their sewage, exiending from Abbey Mills to Barking. To remedy these defects they proposed that in addition to the existing outfall sewers from Old Ford to Barking two new outfall sewers should be constructed parallel to them, and that to prevent the sewage from the higher parts of North London flowing into and surcharging the already over-taxed middle and low-level sewers, a new intercepting sewer should be constructed, extending from Paddington to Old Ford. Dealing with the Isle of Dogs, they suggested the cutting off of this area from all connection with the low-level sewer, and the construction of an independent sewer to carry the sewage from the Isle of Dogs to the Abbey Mills pumping-station, for which independent pumping power should be provided. The works proposed by them on the north side of the river were roughly estimated to cost 920,000*l.* . . . .

As regards the south side of the Thames, the Engineers pointed out that the southern outfall sewer was far too small to receive the contents of the intercepting sewers, and urged the construction of a new sewer at about the same level as the existing one from Deptford to Crossness. They also considered that, in order to improve the drainage and to prevent floodings in the Beckenham, Dulwich, Lower Norwood, Streatham, Balham, and Brixton districts, a new high-level sewer should be formed, commencing by a branch near Balham and another at West Streatham, passing by way of Forest Hill, Brockley, Lewisham, and Lee to Blackheath, and thence to the Plumstead railway-station, parallel to the southern outfall sewer. The estimated cost of these works was given as . . . 1,300,000*l.* . . . Since 1891 the new sewer recommended for the drainage of the Isle of Dogs has been constructed, with the result that not only have cases of floodings practically ceased to occur in the Isle of Dogs, but the discharges into the river from the Isle of Dogs pumping-station have been reduced from an average of 288½ hours per annum during the previous five years to an average of 33 hours for the following five years, with a minimum of 14½ hours.

In accordance with the resolution of the Council, the Engineer, in February, 1894, submitted to us 109 working drawings for the proposed new sewers between Old Ford and Barking. After further considering the whole subject, and feeling that the whole main drainage system was gradually becoming more and more incapable of performing its work, we decided in November, 1895, to recommend the Council to—(*a*) Construct one additional outfall sewer from Old Ford to Barking at an estimated cost of 450,000*l.* (*b*) Construct a new intercepting sewer from Paddington to Old Ford at an estimated cost of 245,000*l.*; and (*c*) Erect pumping-stations at Lots-road, Chelsea, and Imperial-road, Fulham, and construct a new sewer from Hackney Wick to the Abbey Mills pumping-station.

On December 10, 1895, the Council adopted recommendation (*c*), but has since agreed to the erection of one larger pumping-station at Lots-road in preference to the two proposed. As regards the new outfall and intercepting sewers named in recommendations (*a*) and (*b*), the Council declined to adopt our suggestions, and passed a resolution in the following terms:—

'That the general enlargement of the main drain-

age system is not now necessary, but that local floodings need immediate attention, and that the Main Drainage Committee be instructed to bring up a report showing in detail the results of the several works carried out by the Council with a view to relieve the main drainage system.'"

The Committee then referred to works already carried out in compliance with this resolution. Proceeding, they stated: "The construction of all these sewers has had the effect of relieving the adjoining districts in times of rainfall, but the full benefits will, we are assured, not be felt until the new intercepting sewers are formed, as the two systems are largely dependent on each other. In fact, the Engineer has frequently pointed out to us that most of these sewers are, roughly speaking, at right angles to the Thames, and that, unless the intercepting sewers parallel to the Thames are constructed, the effect will be to increase the direct discharge of sewage into the London portion of the river. . . ."

In spite of the improvements which have been effected, the pressing need for additional relief has frequently been brought under the notice of the Committee and strong representations urging the construction of additional relief sewers have been made by various Local Authorities. Most of these authorities urge the construction of the sewers recommended in the joint report of 1891, and deputations from several of them have from time to time appeared before the committee. Conferences of the representatives of several vestries and parishes had been held to discuss the serious condition of affairs arising from the insufficiency of the main sewers, and in November last the Lee District Board, after failure of negotiations, obtained a rule nisi ordering the Council to show cause why a mandamus should not be issued commanding them to consider and determine whether they think any, and if so what, sewers and works are necessary for the effectual sewerage and drainage of that part of the parish of Charlton near to the southern outfall sewer. The learned judges differed in opinion as to whether the rule for a mandamus should be made absolute, Mr. Justice Grantham holding that the Council, by its neglect during so many years to afford any relief to the Charlton district, must be taken to have refused to perform the duty imposed upon it, of making provision for the effectual drainage of the metropolis, and that the Court ought, therefore, to use its powers to compel the Council to take steps to remedy the injury which was being caused. Mr. Justice Kennedy, on the other hand, thought that there had been no continual negligence equivalent to a refusal to perform the duty which by a statute had been imposed upon the Council. Mr. Justice Grantham being the senior judge, his judgment prevailed, and the rule for a mandamus was made absolute. The Committee have since caused an appeal to be lodged which is expected shortly to come on for hearing. In view of the feeling generally expressed by the Local Authorities, the Committee instructed the Engineer to further consider the general question of the condition of the whole system of drainage, and to submit his best advice under all circumstances with due regard to the prevention of local floodings. This he has now done in a report dated April, 1899.

"The Engineer points out that at the time the main drainage system was established the actual population of London amounted to about 2,586,000 persons, and that Sir Joseph Bazalgette designed the system for a total population of 3,450,000, being an average of 46·9 persons per acre over the whole area within the Metropolitan boundary. Provision was made for a water supply of 31¼ gallons per head per day, or a total of 108,000,000 gallons daily, but as it was considered necessary to provide for the fluctuating flow of the sewage at different hours of the day, the sewers were made to carry off half the total quantity of sewage in six hours of the day, together with a rainfall passing into the sewers at the rate of ¼ in. in twenty-four hours. The maximum quantity of sewage and rainfall to be dealt with per day of twenty-four hours was estimated at 250,000,000 gallons on the north side of the Thames, and 144,000,000 gallons on the south side, or a total of 394,000,000 gallons. No provision was made for taking in the drainage from districts outside the Metropolitan boundary, such as parts of Acton and Willesden, Tottenham and Wood Green, Hornsey, West Ham, East Ham, and Beckenham, the sewage of which is now, or about to be, partly or wholly admitted under Parliamentary authority. . . . . The drainage of the borough of West Ham and a part of East Ham will shortly be admitted into the Metropolitan main drainage system. . . . . The Leyton and Walthamstow Urban District Councils have also applied for permission to drain into the Metropolitan system, and similar applications were made in respect of the portions of Acton and Willesden now draining elsewhere. In all these cases the Council has been obliged to refuse to accede to the requests on account of the insufficiency of the sewers to convey the sewage of London proper. In the case of West Ham, however, the Corporation obtained Parliamentary powers in spite of the opposition of the Council. . . . .

We find that the population of the area draining into the Council's sewers on the north side of the Thames, including those districts outside the county boundary, was, according to the census of 1896, 2,941,114, or, say, 3,000,000 persons, and on the south side of the river 1,689,984, or say 1,700,000, making a total of 4,700,000 persons for both sides. A proportionate increase has in all probability taken place during the past three and a half years, and as the system was only intended to serve a population of 3,450,000, it will be seen that the number of persons for whom provision was made has already been exceeded by at least 36 per cent. Turning again to the quantity of water supplied, we find that the average supply is about 35·4 gallons per head per day, which represents a total of about 176,380,000 gallons for the whole population, as compared with 108,000,000 gallons provided for. In the summer months the water supply is still larger, and amounts to as high as 40 gallons per head per day, and we may state that the gaugings taken at the Barking and Crossness outfall works show that during the years 1895-7 the average dry weather flow of the sewers amounted to 194·58 million gallons daily. So far, then, as present requirements are concerned, we come to the conclusion that the main drainage system already accommodates 36 per cent. more people, and in dry weather daily conveys 86,000,000 gallons, or 80 per cent. more sewage than the amount it was constructed to carry.

From these figures it is obvious that as the sewers have become more and more filled up with dry weather sewage, less space is left for rain-water, and therefore the number of hours the overflows into the river take place must increase, and the discharges, owing to a smaller admixture of water than formerly, must become more foul. We view with some apprehension the danger of an increasing pollution of the river from this source, and the system which has worked so well in the past cannot but be brought into disrepute if remedial works are not undertaken. It may be added that occasionally the outlets into the river are tide-locked, and that even when discharges can take place through the submerged outlets and get mixed with the river water, the effect on the foreshore is such as we cannot contemplate with equanimity. The velocity of the water near the river wall and along the surface of the foreshore is at no time great, and the solid matters have a tendency to deposit in the vicinity of the outlets. In fact, quite recently a sum of 721*l.* was spent by the Council in dredging the river in front of two outlets at Charing Cross and one at Horseferry-road, Westminster.

Having viewed the subject as regards the adequacy of the main drainage system in relation to present needs, we now turn to the probable future requirements so far as these can be ascertained, as it is evident that any works that may now be undertaken should be of such a character as will allow of their forming part of any extension in the future. We find that between the years 1851 and 1891 the population of London has increased as follows:—Between 1851 and 1861 the increase was 445,588; between 1861 and 1871 the increase was 458,125; between 1871 and 1881 the increase was 567,209; between 1881 and 1891 the increase was 397,924; or, an average increase of 467,211 persons every ten years. During the *five* years between 1891 and 1896 the increase was 200,900. The resident population of most of the districts has been steadily increasing, and it should be noted that the apparent decrease in the population of the City and such parishes as the Strand and Holborn only applies to the night, as the day population in those parts has beyond doubt enormously increased, and the daily influx of suburban residents only tends to tax the capacity of the intercepting sewers. The average density of population per acre on the north side of the Thames, without taking into account the area, 12,500 acres, not yet built upon, amounts to 106 persons, and assuming that the whole area north of the Thames, excluding open spaces, tidal water, and foreshore, will ultimately be populated in the same proportion, the additional number of people to be provided for will be 271,086, or a total of 3,042,200. Again, considering that on the north side there are fifteen districts, containing an average of from 101·6 to 212 persons per acre, and only eight districts, including the City, Strand, and Hampstead, in which the population is below 100 persons per acre, it may be assumed that the population south of the Thames will in the future reach a density of 100 persons per acre of the area actually built upon. On this basis the area south of the Thames may ultimately have a resident population of 4,054,200, or an addition of considerably more than 2,000,000 to the present number. During the five years 1891-6 the increase of population on the south side alone was 119,244; and it should also be remembered that the population of such districts as Tottenham and Wood Green, Willesden, and West Ham, which are authorised by law to drain into the metropolitan main drainage system, is rapidly increasing.

To summarise briefly the present position of the whole question, it may be stated that the main drainage system was constructed to serve 3,450,000 persons, with an average water supply of 31¼ gallons per head, whereas it now serves 4,700,000, or 36 per cent. more persons, with a water supply of from 35 to 40 gallons per head. The population is increasing at the rate of about 400,000 persons in every ten years, and will in all probability amount to a total of 7,000,000 within the County of London when it is fully built over. The dry-weather flow of sewage for which the system was designed was 108 million gallons daily, whereas the quantity now passing may be taken at about 195 million gallons daily, or an increase of about 80 per cent. The northern low-level sewer was not designed to take any of the sewage west of Chelsea, as it was intended to discharge it after treatment into the Thames somewhere near Imperial-road, Fulham, and as regards the area south of the river Thames the whole of the drainage amounts in dry weather to about 80 million gallons daily, and all this quantity has to pass through the only existing sewer between Deptford and Crossness. Every effort was originally made by Sir Joseph Bazalgette for passing flood water directly into the Thames by means of the then existing sewers which run at right angles to the river. This system has been extended and enlarged until further works in this direction would, with a redundant population to be served, tend to bring back that state of affairs which existed previously to the establishment of the Metropolitan Board of Works, viz., the direct discharge of sewage into the Thames. As the area drained into the Thames becomes more thickly built upon, it is found that the water flowing from the streets after heavy rainfall is as polluted as, and in some cases more so than, the actual flow in the sewers, and the flood discharges which now take place from the storm overflows are of an offensive character.

After reviewing all the above facts the Engineer is of opinion that, in order to bring the main drainage system up to date, works estimated to cost about 2,947,000*l.* should be carried out by the Council, viz., *North of the Thames.* (*a*) Barking to Old Ford—two new sewers and extra works at Barking, 725,000*l.*; (*b*) New sewer between high-level and middle-level sewers, 270,000*l.*; (*c*) New sewer between middle-level and low-level sewers, 500,000*l.*; (*d*) Extension of middle-level sewer to Scrubs-lane, 12,000*l.*; (*e*) Additional pumping machinery at Abbey-mills, 120,000*l.*; Total, 1,627,000*l.* *South of the Thames*—(*f*) Crossness to Deptford—new sewer (low level), 500,000*l.*; (*g*) Crossness to Catford — new sewer (high level), 520,000*l.*; (*h*) Deptford to Battersea — new sewer, 300,000*l.*; Total, 1,320,000*l.*; Total for both sides, 2,947,000*l.*

While convinced of the necessity for ultimately constructing the whole of the above new sewers, and of certain extensions of the same, the Engineer suggests that, in the first instance, only those between Barking and Abbey Mills (part of *a*), Crossness and Deptford, and Crossness and Catford, should be put in hand, inasmuch as the sewers near the outfalls must be completed before those more to the

west can be commenced. We have given the most careful consideration to the important proposals above referred to, and are of opinion that all the sewers recommended by the Engineer must ultimately be carried out, and that the total expenditure of about three millions will have to be incurred as soon as the necessary arrangements can be made. As it is estimated, however, that the work of constructing the outfall sewers will last for about eight years, we think that it is absolutely necessary that as a commencement of the work the capacity of the outfall sewers should be increased without delay. The construction of the intercepting sewers recommended by the Engineer will probably take six years more to complete, and we would emphasise the statement made by the Engineer that, as time goes on, additional obstacles of a serious nature are being placed in the way of the construction of these sewers by the various deep level underground railways that are being laid down. For the present, we confine ourselves to recommending the construction of additional outfall sewers and while approving in principle of the construction of the other sewers, we think it inadvisable for the time being to submit the other proposals, as important variations may become necessary in the course of the next few years. . . . . Dealing first with the north side of the Thames, the first proposal we have to submit is the construction of two additional sewers from the Abbey Mills pumping-station to the Barking outfall. . . . The total length of each of the new sewers will be about 4½ miles, and the Engineer estimates the cost, together with that of extra works at Barking, at 600,000*l.* We should, however, point out that, as the quantities have not been taken out, this estimate is only an approximate one, and may have to be varied after the actual measurements have been made. We recommend:—

(*a*) That the estimate submitted by the Finance Committee be approved, that two additional outfall sewers, each 9 ft. in diameter, be constructed between the Abbey Mills pumping-station and the Barking outfall, and that the Engineer be instructed to prepare the necessary drawings of the new sewers and other incidental works at the Barking outfall, together with detailed estimates of the cost.

The second proposal we have to submit is that the sewer accommodation between the Deptford pumping-station and the Crossness outfall works should be increased. . . . .

The population in the year 1896 was more than double that in 1861, and under all circumstances we are forced to the conclusion that another sewer equal in size to the existing outfall sewer should be immediately put in hand. The total length of the new sewer will be very nearly eight miles, and the Engineer estimates the cost at 500,000*l.*, but, as in the case of the other sewer above recommended, this estimate is not based on detailed measurements or bills of quantities. . . . . We recommend—

(*b*) That the estimate submitted by the Finance Committee be approved, that an additional outfall sewer, 11 ft. 6 in. in diameter, be constructed between the Deptford pumping-station and the Crossness outfall works, and that the Engineer be instructed to prepare the necessary drawings of the sewer and incidental works at Crossness, together with detailed estimates of the cost.

In connexion with the requirements of the area south of the Thames, the Engineer recommends the construction of another high-level sewer from Catford to Crossness, capable of discharging its contents by gravitation into the precipitation channels at the outfall works. We are convinced that as the outlying areas become more and more built upon such a sewer will be a necessity, but for the present we are of opinion that the work may be postponed for a time, and thus allow the expenditure to be spread over a larger number of years. Inasmuch, however, as the portion of this sewer between Crossness and Plumstead railway station will be placed over the proposed new sewer from Deptford to Crossness, we think that it will be more economical to construct both sewers at the same time for that length, as the cost of excavation and other work will thereby be considerably lessened. The total length over which both sewers will be built together is about two and a-quarter miles, and the cost of the portion of the upper sewer at present contemplated from Plumstead to Crossness is estimated at 150,000*l.* We recommend—

(*c*) That the estimate submitted by the Finance Committee be approved, that a portion of the suggested new sewer from the Crossness outfall to Catford, so far as that sewer will be placed over the proposed new sewer from Crossness to Deptford be constructed, and that the Engineer be instructed to prepare the necessary drawings of the sewer and incidental works at Crossness, together with detailed estimates of the cost."

The recommendations were adopted, after discussion and the rejection of an amendment moved by Mr. McDougall.

Illustrations.

MONUMENT: "THE TRIUMPH OF THE REPUBLIC."

THIS grand and energetic group of monumental sculpture, which has occupied M. Dalou for a good many years, was unveiled on the Place de la Nation, Paris, on November 19, as mentioned in our "Letter from Paris" last week, where the final modifications made by the sculptor were described. The original model was illustrated, in a side view, in the *Builder* of April 18, 1885.

The figure riding on the lions represents the Genius of Liberty; the figure on the right of the spectator represents "Justice," that on the left "Labour." The symbolical figure of the Republic, standing on a globe, dominates the whole.

NO. 2, WEST DRIVE, STREATHAM PARK, S.W.

THIS house stands overlooking Tooting Common, and is built of South County clamp bricks, with red brick dressings, the cornice being of wood and the roof of stone slates. A feature of the exterior is that all the flues are contained in two stacks in the centre of the building. This arrangement influences the plan considerably, as will be noted, the staircase being placed in the centre of the house (lighted from a skylight), and the rooms grouped round it, all flues finding their way into the walls of the staircase. The hall is large enough for a billiard-table.

Messrs. King & Son, London, were the builders, the total cost being about 4,000*l.*, Mr. Leonard Stokes being the architect.

The drawing was exhibited at the last Royal Academy exhibition.

ILLUSTRATIONS OF TEXTILE FABRIC DESIGNS.

THESE designs form a portion of the illustrations to Sir Thomas Wardle's paper read before the Architectural Association, and printed in another column of this issue. They are all referred to and described in the paper.

GESSO FIGURE OF A KNIGHT IN ARMOUR.

THIS is a reproduction of a photograph by Mr. Hollyer of a figure modelled in gesso by Mr. and Mrs. Watts, as a study for the figure of the "Black Knight" in Mr. G. F. Watts's picture of "The Court of Death."

The armour was designed by Mr. C. R. Ashbee, and modelled at the Essex House School of Art and Handicraft, by Mr. John Williams, under the direction of Mr. G. F. Watts.

CALIFORNIA UNIVERSITY COMPETITION: PORTIONS OF FIRST PREMIATED DESIGN.

THESE are reproductions from small photographs of two of the drawings by M. Bénard, who obtained the first premium in the recent remarkable competition for the proposed University of California.

For further remarks on the design, see the first article in this issue.

CHURCH, ENFIELD.—A new church, dedicated to St. Luke, has been consecrated by the Bishop of London at Enfield. It takes the place of a temporary iron church. The foundation-stone was laid eleven months ago by the Bishop of Islington, and the building, of which Mr. James Brooks is the architect, has cost nearly 6,000*l.* The edifice is at present incomplete, only one bay of the nave being built. When finished the new church will accommodate 800 worshippers. Illustrations of the building and brief descriptions appeared in our issues for September 24, 1898, and June 17, 1899.

ARCHITECTURAL SOCIETIES.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—A lecture, entitled "Ancient and Modern Buildings in Palestine," was delivered before the members of this Society at the old Medical School, Park-street, Leeds, on the 4th inst., by Mr. Beresford Pite, of London. Mr. W. Carby Hall presided. The lecturer pointed out that the architectural interest of Palestine began with caves, followed by rock tombs, cisterns, oil and wine presses, and sculptured and carved sarcophagi. The architectural influences began with the Egyptian, after which Phœnician and Assyrian influence could be traced. Then followed a Greco-Roman period, then a period more exclusively Roman; and, passing to the Dark Ages, the Arab period was reached—the Arab busying himself with dismantling the Roman buildings, and using the materials in his own erections, very often in an absurd way. Following the Arab time came the Crusading period, which covered Palestine with the most interesting examples of mediæval art, similar to what could be found in France and England, and even Germany. Then there followed the long period of Turkish darkness, which was succeeded by the modern era, out of which was growing a definite modern style in the European buildings; and, sad to relate, our own local Gothic revival had some rather *outré* examples in the Holy Land. The building material of Palestine was a hard limestone of coarse grain, and consequently there had not been carried out in that country any ornament worth the name. There was nothing in the whole country to correspond with the marbles at the disposal of the Greeks, or the granites at the disposal of the Egyptians. Dealing with local regulations and authorities, Mr. Pite explained that when foreigners desired to erect buildings of any size in Jerusalem, an Imperial firman had to be obtained from Constantinople. The lecturer mentioned the circumstances in connexion with getting the firman for the erection of a hospital which he had recently built in Jerusalem.* The lecture, which was illustrated by a number of excellent lantern slides, was followed by a discussion.

GLASGOW INSTITUTE OF ARCHITECTS.—A general meeting of this Institute was held on the 30th ult. in the Rooms, Pitt-street, Mr. David Barclay, President, in the chair. The President gave a summary of the business transacted by the Council during the past quarter. A report was brought up from the Council recommending that honorary membership should be conferred upon the Very Rev. Principal Story, of Glasgow University, and this was unanimously agreed to. Regret was expressed that the memorial of the Institute against the proposed removal of Kelvingrove House had not had the desired effect. The statement made that the architectural members of the Exhibition Committee had advised that there was no merit in the old building sufficient to warrant its being retained was not correct.

ARCHITECTURAL ASSOCIATION OF IRELAND.—An ordinary meeting of this Association was held on Tuesday, December 5, when Mr. H. Norman Leask read a paper upon "Difficult Foundations and Substructures." The lecturer said that unsafe foundations were caused either by the soil being unstable, the building upon them being subject to excessive weight and vibration, or by the adjacent buildings rendering the foundations liable to sink or slide. Having dealt with wood pile and sand pile foundations, Mr. Leask went fully into the methods of sinking caissons under the air lock system. The expense of these was somewhat lessened by the fact that a man would work one and a half times as hard under the greater air pressure than under ordinary conditions. The freezing process for semi-fluid soils used on the Continent was described, pipes being driven into the soil enclosing the position of the shaft to be sunk. These are filled with freezing mixture which solidifies the semi-fluid material and enables it to be dug out, at the same time preventing an inrush from the outside. In his description of American methods of dealing with bad soils, the lecturer showed many diagrams as illustrations. The most general method was that of floating the whole superstructure upon a raft of girders laid at about 2 ft. intervals, the first layer across the walls, the second layer parallel with the walls, the frame thus formed being grouted with cement. Concrete was then laid

* See our issue of January 28 last, for a report of Mr. Pite's lecture.

across the whole site. An example of this treatment in Dublin was found in Messrs. Paul & Vincent's Manure Factory. As showing the strength of concrete for walling, Mr. Leask mentioned a chimney in America over 100 ft. in height which is built of two 6 in. concrete rings, with 1 ft. space between the inner and outer ring, the two being only joined at intervals. In the discussion which followed, Messrs. M'Gloughlin, R. M. Butler, Hudman, and C. H. Ashworth took part.

ENGINEERING SOCIETIES.

THE INSTITUTION OF CIVIL ENGINEERS.—At the ordinary meeting of this Institution, on the 5th inst., Sir Douglas Fox, President, in the chair, it was announced that twenty-three associate members had been transferred to the class of members, and that 171 candidates had been admitted as students. The first ballot of the session, 1899-1900, resulted in the election of thirteen members, ninety-six associate members, and two associates.

THE INSTITUTION OF JUNIOR ENGINEERS.—At the meeting of this Institution, held at the Westminster Palace Hotel on the 1st inst., the Chairman, Mr. Basil H. Joy, presiding, the paper read was on "Natural Methods for the Purification of Water-carried Sewage," by Mr. G. Drysdale Sweetman. After briefly mentioning the chief constituents of ordinary sewage, and the old chemical theory of decomposition, based on the molecular instability of the albuminoids, the author described the biological theory, originated in 1877 by Schloësing and Müntz, and more fully proved by Warington and others, that the process of decomposition is due to the life action of micro-organisms. The organisms instrumental in the disintegration and oxidation of sewage might be divided into three classes—putrefactive, denitrifying, and nitrifying. The first two attacked the various higher compounds of nitrogen, reducing them to simpler forms, which are then attacked, in the presence of oxygen from the air, by the nitrifying bacteria, and converted into nitrous and nitric acid and other harmless inorganic substances. Pasteur had divided bacteria into two main classes—aërobic and anaërobic, the former existing only in an ample supply of air, while the latter could only thrive in its absence. The author expressed the possibility that these were rather different physical states of the same bacterium than separate varieties, and that the organisms underwent a kind of acclimatisation in each case. The fever epidemics of Maidstone and King's Lynn were cited as examples of the necessity of adopting some efficient means of disposal, and so preventing the contamination of sources of water supply and of other domestic commodities. Even in early times the disappearance of solids in cesspits was noticed, but its reason was not then understood. In the same way early, and even comparatively recent, treatment on land by broad irrigation, or by intermittent filtration, had, in many cases, been unsuccessful, owing to the fact that more attention had been given to the rearing of abundant crops than to the efficient purification of the sewage. In all these methods the instrumental factor was the bacterium, and although biological purification was regarded as a novelty, the processes embodied in it had been going on for all time. In broad irrigation systems the action was performed in the surface layer by aërobic organisms. The action in intermittent filtration was in the main similar; hence the necessity of a good open soil for all methods of land treatment, so that a copious supply of air might be carried to the bacteria. The surface formations, methods of distribution, and crops were also considered. As regards quantity, a good loamy soil could purify 10,000 gallons of sewage per acre per day by irrigation, with rest periods, and as much as 70,000 gallons per acre per day by an intermittent downward filtration bed, drained at a depth of 6 ft. The increasing population, and its food supply, and the scarcity, in the future, of good market land was considered, and the use of skilfully-managed sewage farms suggested as a remedy. After showing the great advantages gained by screening, in some form or other, before treatment, chemical methods of disposal were mentioned, with their attendant sludge and other difficulties. It was now possible to treat 1,000,000 gallons of ordinary sewage per day on a filter one acre in extent by purely bacterial means. Sewage made foul by trade wastes could now be, and had been, successfully treated in many places, but there could be no doubt that the action of certain constituents of the wastes on the bacteria was very harmful, and required careful consideration. Various attempts had been made to increase the efficiency of action of biological filters by forcing air, and latterly warmed air, into the body of the filter, but although theoretically efficient, the practical gain was doubtful. In septic tank systems, at the present time, the main question was the most economical capacity of the tank. At Exeter the tank held one day's supply, while in American works smaller tanks had been used successfully and at considerably less cost. Tidal outfalls, their advantages and objections, were spoken of, and also the question of standards of purity of effluents. No fixed standard was applicable under all circumstances, and in the author's opinion more prominence should be given to the volume of water into which the effluent was discharged, and the use to which the stream was put before the sewage was discharged into it. As regards efficiency, all natural systems were really equally efficient, if well managed, but area for area, the septic tank was probably most economical. After this came aërated bacterial filters, aërobic contact beds, intermittent downward filtration through land, and broad irrigation. The approximate initial cost was, exclusive of land, broad irrigation, 30*l*., and intermittent downward filtration, 70*l*. per acre. In the other systems the approximate cost of an installation to treat 1,000,000 gallons daily was for double contact beds, 6,000*l*.; aërated filters, 8,000*l*.; septic tank, 8,000*l*. to 10,000*l*. In the discussion which ensued Messrs. P. J. Waldram, T. C. Morewood, J. H. Pearson, H. N. Gray, H. Cook, L. G. Ferreira, E. A. Berry, and T. Schlund took part. A vote of thanks was accorded the author.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.—The following is an abstract of a paper on "The Fire-Proofing of Floors," read by Mr. J. H. Blakesley, M.A., A.M.Inst.C.E., before the Civil and Mechanical Engineers' Society, on the 7th inst.:—The subject of fire-proofing being such a large one, it is desirable to restrict the observations in this paper to a small branch of the subject, and as a very exhaustive historical account occurs in Vol. CV. of the "Minutes Inst. Civil Engineers," in a paper by Mr. Webster, it is deemed advisable merely to review a few typical structures here in their relations to the general principles to be followed. Progress in these inventions has been retarded by the growing necessity for cheapness, which is not counteracted by occasional fancy specifications. The chief objects in fire-proofing should be to adapt the protection to the actual needs of the building, so as not to increase cost unnecessarily, to avoid thrust on the side walls, and depth or thickness of floor, which increases the amount of brickwork in the building; and lastly, strength in proportion to the weight of the floor. In most cases the floor between the supporting joists is stronger than the joists themselves, and any great excess of such strength over that of the joists is therefore superfluous. With regard to materials, hydrated cement should be avoided when exposed to very fierce heat, though usefully employed where covered by more refractory substances. The advantages of porosity are generally non-conduction of heat and lightness. The disadvantages are the liability to the generation of stresses in the pores when the heated substance is played upon by cold water, and consequent rupture. Maurer's and Wright's bricks are highly porous, and in some cases have shown good results. Coke breeze concrete is another, but of variable fireproofing power according to quality, and some sorts make apparently better fuel than fireproofing material. There is a danger in the best non-conducting substances owing to the stress produced by suddenly cooling the surface, which is likely to cause rupture, and here a hydrated plaster may with advantage be used to protect the principal structure from sudden changes, although not contributing itself to the strength. Fireclay appears to be the best substance for resisting heat, and if properly worked is of considerable strength, as shown by tests made by the author. Nevertheless, those clays which are vitrifiable should be avoided, though stronger than others. In the old brick arch system, the chief disadvantage was the exposure of the joists. This is remedied partly by covering these below, which is of unmixed advantage, and partly by separating the joists widely, which increases weight, depth, and thrust, and is therefore partly disadvantageous. Hollow arches decrease the weight, and flat arches the depth, but the latter increase the thrust, and tie-rods to counteract this have great disadvantages. Hollow flat arches are of two sorts, the end-pressure system and the side-pressure. The former is the stronger, and has the merit of encasing tie-rods, but has disadvantages of erection in practice. Side-pressure arches are not so strong, but are preferred generally on account of their hollows being parallel to the joists. A great requisite for economy is uniformity of section in the blocks, that they may be made by being squeezed through dies. In America the side and end pressure systems have been combined. Flat floors are stronger than requisite when in solid slabs, and when hollow, in double slabs, are otherwise inconvenient. Thin slabs strengthened with metal and supported on joists, far apart and separately cased have been largely used. Tubular lintel floors have many advantages, being light and strong and protecting inferior concrete laid over them. They are also far more sound-proof than solid floors—a great desideratum. They also have some practical disadvantages. Small arched floors get rid of some of these disadvantages, while preserving the main merits of the transverse tubular floor.

SOCIETY OF ENGINEERS.—At a meeting of the Society of Engineers, held at the Royal United Service Institution, Whitehall, on Monday evening, Mr. John C. Fell, President, in the chair, a paper was read on "Water Supply to Country Mansions and Estates," by Mr. Gordon Harris, Assoc. M. Inst. C.E. The author first pointed out that the subject of his paper presented features of interest in connexion with minor water supplies. He observed that the cost of supplying an estate with water by the antiquated methods of either manual labour or uneconomical steam engines was very high. A gravitation scheme is far preferable, provided the source of supply is not too far distant. The objections to manual labour were pointed out, and pumping by animal power was considered more economical than by hand power. A small steam engine is not desirable on account of the heavy fuel bill and cost of attendance it involves. A gas engine can rarely be used in country mansions owing to the absence of a gas supply, but where gas is available a gas engine is very advantageous. The oil engine was strongly recommended as possessing every advantage as regards its fuel supply, its simplicity, and its economy in working. The author then gave the following comparison of the cost of pumping 1,000 gallons of water to a height of 100 ft. by various powers:—

1.	Hand labour at 18s. per week ...	26·5 pence
2.	Horse power, man at 18s. per week	4·20 "
3.	Gas engine and pump, with gas at 4s. per 1,000 c.f.	1·44 "
4.	Small steam pump and boiler, with coal at £1 per ton	0·75 "
5.	Oil engine and pump, with oil at 7d. per gallon	0·70 "
6.	Electrically-driven pump, worked from a lighting dynamo	0·45 "

The cost of attendance is excluded in Nos. 3, 4, 5, and 6, as in some instances it may be negligible, although in No. 4 an allowance should be made varying in amount with the total daily supply and other conditions, and an addition must be made for coal used in getting up steam. As the cheapest and most lasting water raiser the author stated that the hydraulic ram still retained its popularity. Water wheels, hydraulic pumps, and windmills were also discussed and their respective advantages and disadvantages pointed out. Examples were then given of the practical application of the mechanical agents referred to, and installations of various kinds on several estates and in large establishments were described and illustrated. Amongst other useful pumping appliances employed the "Hatfield" treble barrel pump, manufactured by Messrs. Merryweather & Sons, was referred to. This pump can be driven at 700 revolutions or more per minute, and may therefore be coupled direct with an electric motor. It was stated that a number of these pumps are running in connexion with water services, being driven by small high-speed oil engines as well as by electric motors. Another engine, known as the "Squires," has also been designed for special use on estates, and is applicable to general purposes as well as for water supply. The author next dealt with the question of well-boring, concerning which

much useful information was given. The subject of locating water by divining was also touched upon, the author observing that some very curious successes had been achieved by that means, but at the same time he instanced a case in which he was consulted where the diviner's prediction had proved utterly valueless. The details of water supply, storage, filtration, and use were then discussed and the most desirable apparatus for the various purposes involved were described. The supply of water to small villages adjoining large estates, concurrently with that to the estate itself, was also referred to, and its advantages, under certain conditions, were pointed out. The important question of the utilisation of a portion of a water supply for fire-extinguishing purposes was next considered. The author observed that a large reserve must be secured for this purpose, and he described various arrangements of fire-service that he had carried out in practice. These arrangements included gravitation and power systems. For meeting cases in which there is a deficiency of pressure, the author has devised a very efficient automatic pressure augmentor, which he explained. He then described the system of fire-service adopted at St. Michael's Mount, Cornwall, recently installed by Messrs. Merryweather. In conclusion, the author observed that, failing the existence of the conditions necessary for a gravitation supply, or if the adoption of powerful machines was inadmissible for fire extinction, recourse must be had to the portable steam engine or to the less efficient manual engine, provided the source of supply was situate within a reasonable distance.

ARCHITECTURAL ASSOCIATION DISCUSSION SECTION.

THE fourth meeting for the session was held at 56, Great Marlborough-street, on Friday, the 4th inst., Mr. W. B. Hopkins in the chair. Mr. F. C. Eden read a paper on "Church Furniture," which was illustrated by a fine series of photographs and drawings of both ancient and modern examples. Mr. Eden commenced with some general advice, and pointed out the necessity for a church architect to possess some liturgical and ecclesiological knowledge. The Church had certain rules which it was the architect's business to know, and, failing written rules, he had to follow not foreign, but English, tradition. He considered that scarcely any church repaid the pains taken in furnishing or showed good furniture to advantage, except it were plastered and whitewashed internally.

Several vulgar and common errors in furniture were exposed—*e.g.*, putting the credence on the wrong side of the sanctuary, piling shelves on the top of the altar, and placing the font in a baptistry instead of in "the ancient usual place" required by the canons.

Mr. Eden carefully distinguished between "essentials" and "non-essentials," and urged that a poor mission church could not do with less furniture than the following (exclusive of vestments for the minister, sacred vessels, and so forth) :—An altar of stone,* with at least one frontal, two sets of linen, a pair of candlesticks, and a cushion for the book ; a reading pew for the priest ; a font with cover and a screen between sanctuary and nave : everything else to be added as the funds permitted. The altar was considered in detail, with its decoration, material, and accessories, and many important points were mentioned, and drawings shown to illustrate the altar furnished as directed by the ornaments rubric of the Prayer Book. The furniture of the chancel and choir were described, and the screen and rood-loft carefully considered. Chairs were advocated as giving a better architectural effect to the church than pews, and being more convenient for cleaning the church. It was necessary to have a cover to the font, and some beautiful examples were shown from the eastern counties.

Mr. Walter Millard opened the discussion, and said he considered that very few men should be entrusted with church work, and that they specially required a constant desire to learn more and more about ecclesiology, and that, further, they needed good common sense to use that knowledge when acquired. A pulpit, he stated, was never complete without its canopy and back.

* Why necessarily "an altar of stone?" The preface to the Communion Service speaks only of a "table," and says it may stand "in the body of the church or in the chancel."—ED.

Mr. H. Rose proposed a vote of thanks to Mr. Eden, which was seconded by Mr. G. Lucas, who made some useful suggestions as to details.

The discussion was continued by Messrs. Strange, Brodie, Cautley, Crosbie, H. V. C. Smith, G. H. Smith, and Dawson.

Mr. G. H. Fellowes Prynne, the Special Visitor, summed up the discussion in a very able manner, making some valuable remarks on the symbolic principles which should underlie all church architecture.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring Gardens, Lord Welby, Chairman, presiding.

Quantity Surveyors.—The General Purposes Committee brought up the following Report, the recommendations being agreed to :—

"We are informed that the architect is at the present time experiencing considerable difficulty with regard to the taking out of quantities owing to the limited number of the surveyors employed by the Council. These, for architectural works, as the Council is aware, are four in number, and it has been suggested to us that in order to meet the existing pressure, authority should be given for a temporary arrangement to be entered into with three additional surveyors. As stated in our Report to the Council on the 14th instant, we have under consideration the whole question of the present standing orders relating to the taking out of quantities, but we are not yet in a position to bring up a report on the subject. In the meantime it is, of course, essential that no delay should occur in taking out quantities, and we would accordingly ask the Council to authorise the employment of three additional surveyors, as suggested. On the 14th inst. the Council authorised an agreement being entered into with one of the quantity surveyors by which that surveyor should be made responsible for his quantities; and we are of opinion that it is desirable that a similar course should be followed in the case of the three surveyors whom it is now proposed to employ. In view of this increased responsibility it will, of course, be necessary to allow a higher rate of remuneration than under the agreement with the present surveyors, and we have accordingly prepared a revised scale which we think would meet the case. We may add that the arrangement to which we are now asking the Council to agree is merely intended as a temporary expedient to tide over the immediate pressure, and we reserve the right to ask the Council to reconsider this arrangement when we are in a position to report on the whole question of the taking out of quantities. We will in due course submit the names of the firms whom we propose should be employed in the event of our recommendations being adopted. We recommend—(*a*) That authority be given for the employment, as a temporary measure, of three additional quantity surveyors. (*b*) That Standing Order No. 209, under which the Council accepts the responsibility of the quantities taken out by the quantity surveyors, be suspended ; that the three additional surveyors referred to be made responsible for their quantities ; and that the solicitor be instructed to prepare the necessary agreements."

Main Drainage.—A long debate then took place on the following amendment by Mr. McDougall to some recommendations of the Main Drainage Committee :—"That the Council reaffirms its resolution of December 10, 1895, viz., that the general arrangements of the main drainage system is not now necessary, but that local floodings need immediate attention, and that therefore the recommendations be referred back to the Committee."

The amendment, which was seconded by Mr. Idris, was defeated by a large majority. The recommendations of the Committee, and the greater part of their Report, will be found on page 534.

Housing, Deptford.—Consideration was resumed of a recommendation by the Housing of the Working Classes Committee that they should be authorised to prepare plans for a new lodging-house for the men on Mill-lane area, Deptford, to be constructed upon the lines of the RowtonHouses. It was proposed to accommodate 800 lodgers at 6d. each per night. After the defeat of various amendments, the committee's recommendation was agreed to.

Improvements.—Replying to questions, Mr. Shaw Lefevre, Chairman of the Improvements Committee, stated that all the property required for the Bozier's-court improvement, Tottenham Court-road, would be in the hands of the Council by the middle of January next, after which they would proceed to demolish the buildings. The cause of the delay in carrying out the Old-street improvement would be reported upon by the Committee.

It was agreed that the amount of the Council's contribution to the Wandsworth District Board in respect of the widening of Wandsworth-road between Wandsworth-road railway station and Rozel-road be 1,200*l.* ; and that the amount of the Council's contribution to the Strand District Board in respect of the widening of Drury-lane at No. 95, 96, and 97, be 3,171*l.* 10s. 6d.

The Council adjourned soon after seven o'clock.

METROPOLITAN ASYLUMS BOARD.

THE fortnightly meeting of the Managers of the Metropolitan Asylum District was held at the County Hall, Spring Gardens, on Saturday, Sir Edwin Galsworthy, Chairman, presiding.

High Wood School.—A letter was read from the Local Government Board stating that they had approved under seal the plans of the High Wood School, and asking for a revised estimate of the cost of the work.

Wages of Carpenters.—On the recommendation of the Hospitals Committee it was resolved that the carpenters at the several hospitals should receive the trade union wage of 36s., without board, instead of 25s. with board and uniform as heretofore. The hours of labour were fixed at 7 a.m. to 6 p.m. (Saturdays 2 p.m.) in summer, and 7 a.m. to 5 p.m. (Saturdays 2 p.m.) in winter. The only change is that work will now be stopped an hour earlier in the evenings in winter.

APPLICATIONS UNDER THE LONDON BUILDING ACT, 1894.

AT the meeting of the London County Council on Tuesday, the following applications under the London Building Act were considered. Those applications to which consent has been given are granted on certain conditions. Names of applicants are given in brackets. Buildings are new erections unless otherwise stated.

Lines of Frontage and Projections.

Clapham.—Four three-story houses with bay-windows in front, on the south side of Nightingale-lane, Clapham, at the corner of Blandfields-street (Mr. L. S. Rogers for Mr. R. Parr).—Consent.

Dulwich.—A building on the east side of Green-lane, Penge, at the corner of Parish-lane (Messrs. G. Elkington & Son for the Penge and Beckenham Co-operative Society, Limited).—Consent.

Hackney, North.—That the application of Mr. J. Jones for an extension of the periods within which the erection of a one-story addition at the rear of No. 1, Clissold Park Villas, Stoke Newington, at less than the prescribed distance from the centre of the roadway of Park-lane, was required to be commenced and completed, be granted, upon the condition that the addition referred to be commenced within two years and completed within three years from March 27, 1899.—Agreed.

Kensington, North.—The retention of a one-story station building erected on the north side of Holland Park-avenue, Kensington, at the corner of Lansdowne-road (Sir Benjamin Baker for the Central London Railway Company).—Consent.

Lewisham.—A dwelling-house on the west side of Montague-avenue, Brockley, to abut upon Chalsey-road (Mr. S. Frampton).—Consent.

Lewisham.—Bay-windows to thirteen houses on the west side of Broadfield-road, near its junction with Sandhurst-road, Hither-green, Lewisham (Mr. G. F. Logsdail for Mr. A. C. Corbett, M.P.)—Consent.

Paddington, South.—The retention of a water-closet addition erected at the side of the entrance lobby to No. 36, Gloucester-square, Paddington, abutting upon Radnor-place (Messrs. Joseph, Son & Smithem for Mr. A. L. Cohen).—Consent.

St. Pancras, North.—An addition at the rear of the "Junction" Tavern, No. 101, Fortess-road, St. Pancras, to abut upon Lady Somerset-road (Messrs. Saville & Martin for Mr. W. Holland).—Consent.

St. Pancras, West.—a building on the north side of Hawley-crescent, St. Pancras, at the corner of Kentish Town-road (Messrs. W. Bradford & Sons for the Camden Brewery Company, Limited).—Consent.

Hackney, Central.—A projecting shop-front upon part of the forecourt of No. 1, London-fields, West Side, Hackney (Mr. J. Browning).—Refused.

Hackney, Central. — One-story additions upon part of the forecourts of Nos. 358 and 360, Kingsland-road, Hackney (Mr. D. Gilson).—Refused.

Hammersmith.†—An addition to the Athenæum, Godolphin-road, Shepherd's-bush, to abut upon St. Stephen's-avenue (Messrs. J. T. Wimperis & Arber for Mr. J. C. Platt).—Refused.

Islington, South.—A one-story booking-office, with an iron and glass roof in front, on the site of Nos. 399, 401 and 403, City-road, Islington, at the corner of Torrens-street (Messrs. Douglas Young & Co. for the City and South London Railway Company).—Refused.

Lewisham.—An illuminated iron and glass sign over the entrance to the "Golden Lion" public-house, No. 116, Sydenham-road, Sydenham (Messrs. Benwell & Norfolk for Mrs. A. P. Smith).—Refused.

Limehouse.†—An illuminated iron and glass sign over the entrance to the "Cape of Good Hope" public-house, No. 787, Commercial-road East, Limehouse (Mr. C. Dunch for Mr. N. Munro).—Refused.

Paddington, South.†—An illuminated iron and glass sign over the entrance to the "Oxford" hotel, No. 77, Edgware-road, Paddington (Mr. G. E. Tombs for Mr. E. Colatto).—Refused.

Wandsworth.—Continuous iron and glass shelters in front of the houses with shops on the north and south sides of Hildreth-street, and Nos. 2 to 20 (even numbers only) Bedford-hill, Balham (Mr. W. N. Paice for the executors of the late Mr. J. J. Brown).—Refused.

Wandsworth.—An addition at the rear of the "Duke's Head" public-house, Lower Richmond-road, Putney, to abut upon the roadway of the embankment of the river Thames (Mr. C. H. Flack for Mr. A. Brewer and Messrs. Young & Co., Limited).—Refused.

Width of Way.

Bermondsey.†—A building on the west side of Wright's-buildings, Grange-road, Bermondsey (Messrs. Gordon, Lowther & Gunton for Messrs. A. Ross & Company, Limited).—Consent.

Peckham.—A two-story building on the north side of Wagner-street, Old Kent-road, Peckham. (Mr. T. O. King).—Consent.

Rotherhithe.—Warehouses on a piece of land bounded by Queen Elizabeth-street, Lafone-street, Goat-street, and Boss-street, at less than the prescribed distance from the centres of those streets (Messrs. Dunk & Bousfield for Messrs. G. Payne & Co., Limited).—Consent.

Islington, North.—Residential flats on the east side of Pine-grove, Tollington-park, Islington (Mr. R. Midworth for Mr. J. C. Hill).—Refused.

Rotherhithe.—A warehouse on the south side of St. Thomas-street, Rotherhithe, at less than the prescribed distance from the centres of the roadways of Great Maze Pond and Maze Pond-terrace (Messrs. Tebbitt Brothers).—Refused.

Space at Rear.

Dulwich.—A modification of the provisions of section 41 (1) (vi.) of the London Building Act, 1894, with regard to open spaces about buildings, so far as relates to the proposed erection of three houses with shops on the north side of Half Moon-lane, at the corner of Herne Hill, Dulwich, with irregular spaces at the rear (Mr. J. W. Brooker for Mr. G. A. Young).—Consent.

Fulham.—The retention of a one-story billiard-room at the rear of the "Greyhound" public-house, No. 115, Fulham Palace-road, Fulham, at the corner of Greyhound-road (Mr. T. W. Biggs for Mr. R. Dean).—Consent.

St. George, Hanover-square.—The rebuilding of a dwelling-house at the rear of No. 9, Grosvenor-square, fronting upon Duke-street, at the corner of Duke's-yard, with an irregular space at the rear, and a portion of the building to extend above the diagonal line directed to be drawn by Section 41 of the Act (Mr. G. Chappelow for Sir Arthur D. Hayter, Bart.).—Consent.

Deviation from Certified Plans.

Strand.—Deviations from the plans certified by the District Surveyor, so far as relates to the proposed rebuilding of No. 20, Whitcomb-street, at the corner of St. Martin's-street, St. Martin-in-the-Fields (Messrs. Eedle & Meyers for Mr. J. Adamson).—Consent.

Width of Way and Projections.

Westminster.†—The erection in front of a building about to be erected next the Church House, Great Smith-street, Westminster, of an oriel window and projecting buttresses (Sir Arthur Blomfield & Sons for the Corporation of the Church House).—Consent.

Line of Frontage and Construction.

Hammersmith.—The retention of a range of bottle racks in the yard adjoining No. 18, Becklow-road, Shepherd's Bush (Mr. D. Blackwell).—Consent.

Formation of Streets.

Fulham.—That an order be issued to Mr. W. H. Scrymgour, sanctioning the formation or laying out of a new street for carriage traffic to lead from Napier-avenue to Cromwell-avenue, Hurlingham-road, Fulham; the widening of portions of Napier-avenue, Cromwell-avenue, and Hurlingham-avenue; and the abandonment of the formation of a portion of Ranelagh-avenue (for Mr. A. F. Pennell). That the name Hannington-street be approved for the new street.—Agreed.

Westminster.†—That an order be issued to Mr. O. Fleming sanctioning the formation or laying out of eight new streets for carriage traffic upon the Millbank estate, Grosvenor-road, Westminster (for the Housing Committee of the Council). That the names Earl-street (in continuation), Bulinga-street (in continuation), Atterbury-street (in continuation), Cureton-street, Erasmus-street, Herrick-street, Dundonald-street, and St. Oswulf-street be approved for the new streets.—Agreed.

Wandsworth.†—That an order be issued to Messrs. Marler & Co. refusing to sanction the formation or laying out of a new street for carriage traffic to lead from Mitcham-lane to Thrale-road, Streatham (for Col. R. J. Aspinall).—Agreed.

Height of Buildings.

City of London.—A building on the south side of Fenchurch-street, City, at the corner of Lloyd's-avenue, with the flank next Lloyd's-avenue to exceed in height the width of that street (Messrs. Davis & Emanuel for Mr. J. Dixon).—Consent.

Means of Escape from Top of High Buildings.

Strand.—Means of escape in case of fire, proposed to be provided on the fifth and sixth stories of Donington House, Norfolk-street, Strand (the upper surfaces of the floors of which the stories are above 60 ft. from the street level), for the persons dwelling or employed therein (Messrs. White & Co., for the Law Land Company, Limited).—Consent.

Dwelling Houses on Low-Lying Land.

Woolwich.—One hundred and eighty-two dwelling houses on low-lying land on the Whitehart Estate, Plumstead (Messrs. Meakin & Archer, for Mr. P. W. Dolton).—Consent.

The recommendations marked † are contrary to the views of the Local Authorities.

ROWTON HOUSE, HAMMERSMITH-ROAD, W.

ROWTON HOUSE, Hammersmith, is the fourth of a series of "Poor Men's Hotels," known as "Rowton Houses," the property of Rowton Houses, Limited. The first, situated at Vauxhall, opened in 1893, has 475 cubicles; the second, at King's Cross-road, opened in 1895, has 677 cubicles; the third, at Newington Butts, opened in 1897, has 805 cubicles; and the present building has 800 cubicles. In addition to these, plans have been prepared for a fifth, at Whitechapel, with over 800 cubicles.

The building at Hammersmith, which is now ready for occupation, has been erected on a site within 250 yards of Hammersmith Station, and has its entrance frontage in Hammersmith-road. The site consists of two parallelograms, the smaller of which forms the frontage to Hammersmith-road, and has a frontage of 65 ft. by a depth of 102 ft. to its junction with the larger, which has a width of 160 ft. by a greatest depth of 276 ft., with a total superficial area of 44,000 ft. The frontage to Hammersmith-road is occupied by the entrance to Rowton House, and three business premises forming part of the building scheme.

The main building has been set back from Rose and Crown-lane (the eastern boundary of the site) a distance of 30 ft., and from the western boundary which is now occupied by new adjoining buildings of but two stories in height, a distance of 25 ft.; the upper or cubicle floors are planned in this form ⊓ with staircases at the three extremities, the inner courtyard being 60 ft. wide and open to the south for access of sunlight to all cubicles and rooms. Advantage has been taken of the large area of the site to place all the day-rooms used by lodgers on the ground floor. The elevations have been erected in pressed Leicester facing bricks, relieved with Fletton bricks and dressings of pinky buff terra-cotta from Mr. J. C. Edwards, Ruabon. The whole of the interior walling, excepting where glazed bricks are used, is built with Fletton bricks. All brickwork throughout the building has been built in Portland cement mortar. The roofs to the front elevations are covered with green slates, nailed direct upon coke breeze concrete slabs, carried upon steel construction; all other roofs are flat, concrete and steel construction, covered with asphalte. The ground floor of the site is covered with a thick bed of concrete, upon which, where wooden floors are laid, is solid oak wood blocks and to other floors cement and granite chippings. The floors are fireproof throughout, formed of concrete and steel, and the staircases and landings are in Portland cement concrete. A system of lighting has been adopted giving the official on each floor of cubicles control of the gas upon that floor; the various rooms on basement and ground floors are controlled separately, one from another, and, in addition, the superintendent has complete control, in the meter-room, over all the various sections. Meters are placed on each section that any excessive use of the lighting may be traced.

The building is divided for administrative purposes into five sections:—1. Superintendent's apartment, with separate accommodation for office clerk; 2. Bed-makers; 3. Catering section, which includes sleeping accommodation for females employed in shop, kitchen, and scullery; 4. Lodgers' day-rooms; 5. Lodgers' cubicles. The sections 1, 2, and 3 are planned so that there is no communication whatsoever between them and the lodgers' sections 3 and 4, except by passing in view of the clerk's office at the entrance on the ground floor.

Women are employed as bed-makers; they are day servants, and do not sleep in the building. The section used by them is approached by the gate at the foot of the staircase, next the entrance, with a separate staircase giving access to their rooms in the basement and to the cubicle floors. The walls of the staircase are in ivory glazed brickwork. In Section No. 2 there are sitting-room, soiled linen room, and linen and blanket rooms.

The portion of the ground floor approached by the corridor inside the entrance lobby to the office is occupied by the catering department, with sitting-room and bedrooms for the female staff adjoining the kitchen. The accommodation is as follows:—Kitchen.—33 ft. by 19 ft. Built in ivory glazed brickwork from floor to ceiling, floor solid wood block with quarry tiled margin and hearths. Scullery.—24 ft. by 18 ft. 6 in. Built in ivory glazed brickwork from floor to ceiling, fitted up with large teak sinks, with teak draining boards, plate-racks, and dresser. A turntable service, fitted into glazed brickwork, is provided from scullery to lodgers' crockery store. Stores for utensils for kitchen, &c., adjoin. Larder.—18 ft. by 10 ft. Built in ivory glazed brickwork from floor to ceiling. Service lobbies and stores.—A corridor, built in ivory glazed brickwork, gives access to a sitting-room and five bedrooms, bath-room, lavatory, &c., for the use of the female staff employed in the catering department. Cellarage for coals is provided in this section.

Lodgers' Day-rooms, &c.—The entrance and corridors opening out from the same to the various rooms, and the three staircases, are built in glazed brickwork from floor to ceiling, the dado formed in cream and chocolate glazed bricks and above ivory glazed bricks, including the moulded cornice. The main entrance and screen doors are in polished teak. The floor is cement and granite chippings. Oak seats are provided in positions out of the line of traffic, in corridors. Water is laid on for drinking purposes in the corridor next the reading-room. The smoking-room is the first, to the right hand, in the main entrance corridor adjoining the cubicle staircase. The tables and seats are teak, as in the dining-room, and, as fitted, seat 164 lodgers. Glazed faïence mantels and overmantels are provided and fitted with large open fires. A large fireplace bay window gives view into courtyard to the south. The reading-room is placed next to the smoking-room on the same side of corridor, and is an L-shaped room with a similar bay to that in smoking-room. The walls have glazed brick dado with plastering to tint, as in the smoking-room. The seats and tables, in teak, provide for 176 men, and there are, in addition, a number of wooden easy chairs around the four glazed faïence fireplaces, and in other parts of the room. The dining-rooms are on the left hand in the main corridor, and have a frontage towards Rose and Crown-lane, with large ventilating top lights into the central courtyard of the building in addition to large windows in all walls. The floor space provided in these rooms is 5,722 ft.; seating is provided at the tables for 464 men, and in addition a number of extra seats and wooden easy chairs are provided. The tables and seats are in teak on cast-iron standards. Four large cooking ranges, with ovens, hot plates, and grills are provided out of the line of traffic in each part of rooms; large boilers at the back of these provide a supply of boiling water for lodgers for cooking, tea, &c. The lodgers' scullery is placed between the two large dining-rooms, with access from both, and is a provision to enable lodgers who wish to prepare their own food for cooking to do so out of the dining-rooms. It is fitted up with twelve white enamelled fireclay sinks, with hot and cold water supply to each and teak draining boards. The crockery and service is provided at the end of the dining-room next to the shop. Crockery, cooking utensils, teapots, &c., are placed here for the free use of lodgers who wish to prepare their own food, and are collected by the company's officials from dining-rooms after use, and returned by turntable service formed in this room to the catering scullery. A shop is planned with teak shop front opening into and giving a view of the dining-room. It is stocked with goods to meet the varied requirements of lodgers. A large space opposite the dining-room has been divided up into six corridors, top lighted and ventilated, fitted with lockers. The lockers, over 800 in number, are uniform in size, 3 ft. high by 1 ft. 6 in. square inside, fitted with shelf and lock; each locker is ventilated and numbered. These are arranged in tiers, three in height. Along the whole of the frontage, opposite the dining-rooms, next to Rose and Crown-lane, a smoking-lounge has been formed with a sheltering roof, carried at the back on the boundary wall of the site and at the front on columns; the space therein is fitted up with seats as a lounge. This lounge is approached by a door adjoining the south-east main staircase. A room is provided and fitted up with hot and cold water and the usual fittings for a barber's shop. The lavatory is between the two southern staircases, entered from the main corridor at one end and from the south-east staircase corridor at the other; it is 36 ft. wide by 45 ft. long.

There are eighty lavatory basins, white enamelled fireclay, fitted up with polished slate top, brass taps for hot and cold water supply to each basin, towel and hat rails. The waste pipes from each lavatory are discharged over an open white enamelled earthenware channel in the floor, and the flooring is laid with falls to this channel throughout for cleansing and speedy drying. The hot-water pipes are exposed, that the radiated heat may be utilised for warming lavatory. A room, opening out of the lavatory, is fitted up for feet-washing, with eight deep feet washing troughs, with teak boards between each, and hot and cold supply carried to each trough. The walls are of glazed brickwork, as in the lavatory. The bath-rooms, six in number, are placed on one side of a corridor, approached under the south-west staircase. They are each fitted up with ivory-glazed fireclay baths. The walls and front of bath are in ivory-glazed brickwork. A room is provided in the bath corridor for use as a dressing-room to enable lodgers to change their garments during the hours that access is not permitted to cubicles. The lodgers' washhouse at the end of the main corridor is for the use of lodgers who may wish to wash their own garments, and is fitted with ten washing troughs in ivory-glazed fireclay, and a large heating stove surrounded by a galvanised iron framework for the speedy drying of garments. Two rooms, adjoining the lavatory, are provided and fitted up as workshops for shoemaker and tailor. Outside the shoemaker's room a space is fitted up for clothes and boot cleaning, and tables are also provided in locker corridors. A room built in ivory glazed brickwork from floor to ceiling, fitted with a cooking-range, table, lockers, and other fittings, is provided for the officials who are employed in Sections 4 and 5. A room is fitted up under the ground-floor locker-rooms for the storage of tool chests and other bulky articles that the lodgers may desire to have taken charge of.

Water-closets and urinals are placed outside the building in the courtyard, at the south-west of the building, and are cut off from the same by means of a cross-ventilated lobby. The work throughout is constructed in white glazed brickwork. There are forty water-closets (in addition to those on the cubicle floors) placed in one building, top lighted from end to end, and top louvre ventilated. There are ten urinals in the same building. A fumigating room is provided outside the building, and a drying room is formed in a position where waste heat from furnaces is utilised.

The lodgers' cubicles are approached by three fireproof staircases, built in ivory glazed brickwork, two situated at the south boundary of the site, one adjoining the office, and all at the extreme ends of the cubicle corridors. The disposition of the staircases renders it an impossibility for the lodgers to be trapped by fire, in the event of an outbreak, as the cubicle corridors run from staircase to staircase, thereby leaving open a way for retreat in the event of access to one staircase being blocked. In addition, each floor is divided by divisional walls into eleven sections, which would check, if not stop, the progress of a fire horizontally. There are five floors of cubicles; each bed is in a separate cubicle, and every cubicle in the building has a window under the control of the occupant. The portion of the cubicle partition next the corridor is 6ft. 6in. high, while the divisions dividing the cubicles are 7 ft. 6 in., leaving a space, up to ceiling level, free of partitions for ventilation. Two water-closets and a sink with cold water drinking supply are placed on each staircase landing outside the entrance to cubicles, thus providing six water-closets and three sinks on each floor for night use. A room with an external window has been provided on every floor for the reception of linen, &c., from the lift, which is formed therein. The charge for a cubicle, with the use of day-rooms, lavatories, and other conveniences, is sixpence per night.

The company has carried out its own work, under the superintendence of the architect, Mr. Harry B. Measures.

BOOKS RECEIVED.

CENTRAL STATION ELECTRICITY SUPPLY. By Albert Gay and C. H. Yeaman. (Whittaker & Co.)

MODERN FARM BUILDINGS. By A. Dudley Clarke. Third edition, revised and enlarged. (B. T. Batsford.)

THE PARIS EXHIBITION.—The British Fire Prevention Committee announce that they have withdrawn their proposed collective exhibit for the Paris Exhibition, as they, and the forty-five firms manufacturing fire-proofing material who would have been concerned in the exhibit, consider that the state of affairs in France at present is not opportune for such an exhibition of English work. The committee have also withdrawn the special scientific exhibits which they had themselves proposed.

ENLARGEMENT OF THE LAND REGISTRY.—The Commissioners of Her Majesty's Works and Public Buildings have prepared a Bill for next session, which shall enable them to acquire some houses lying between Portugal-street, Serle-street, and Lincoln's Inn-fields, for an addition, on the east side, of the Land Registry Offices.

Correspondence.

To the Editor of THE BUILDER.

SECRET COMMISSIONS.

SIR,—I have watched this subject in your various numbers with great interest, as I think we provincial architects suffer more annoyance from this source than our town brethren. I may say that the advice given in your paper of to-day has been practised by me for the last twelve months, and I now keep a printed form, which is worded as follows:—

"Yours of the duly to hand. In answer to same I beg to say that I cannot see my way clear to specify your goods for any of my buildings owing to your offer of a commission, a practice most insulting to my profession."

This form I have filled in and posted to those manufacturers who make me such offers, and I find that up to now it is having the desired effect.

I am quite of your opinion that if all architects would take the trouble to do likewise, the practice would soon cease. EDGAR M. LEEST.

Devonport, December 2.

A DISCLAIMER.

SIR,—As I am subject to much annoyance by the publication and issue of circulars, letters, and advertisements by a firm calling themselves "Ansell & Mallows," I should be much obliged if you will let me say that I have nothing whatever to do with them. To those who know me personally I hope such a disclaimer as this is unnecessary.

C. E. MALLOWS.

CRYSTAL PALACE BAND-STAND COMPETITION.

SIR,—I note your correspondent's letter in the current issue of your paper, and I may inform him that I have already twice communicated with the Secretary to the Crystal Palace Company (the second time as recently as 23rd ult.), and have met with a similar experience to that noted by your correspondent. Mr. Stanley Peach, architect to the company, is supposed to be the assessor; and I, for one, should not have competed had not an architect been nominated to make the selection.

ANOTHER COMPETITOR.

SIR,—I am pleased to see a letter in this week's *Builder re* the above competition.

All I can say is that I fully endorse "A Competitor's" view on the matter. I hope they will do something shortly. "ANOTHER ONE."

*** We have letters from other competitors making the same complaint.—ED.

The Student's Column.

ROADS: THEIR CONSTRUCTION AND MAINTENANCE.

PART IV.—MAINTENANCE (*continued*).

24. REPAIRING BROKEN STONE ROADS.

FROM what has already been said as to the conditions of wear upon roads it will be seen that in order to preserve the surface in good condition it will be necessary to restore an amount of material equivalent to the waste, which has been variously estimated at between 1 in. and 4 in. per annum, according to the amount of traffic and the quality of the road-stone. Left to itself the road coating gradually becomes thinner and weaker owing to the grinding down of the stones into small fragments and the removal of mud and dust from the surface. From what has gone before, it will also be evident that this waste is not uniform, even when the quality of the road material and the nature of the traffic are the same. Certain parts of the road will always be found to be more susceptible to disintegration than others. Any causes, for example, which prevent portions of a road from drying up after rain, either on account of defective drainage or the sheltering influence of trees or high hedges, will increase the rapidity of wear. It has been stated that trees alone may add as much as 25 per cent. to the cost of maintenance from this cause. In exposed situations also, where there are heavy rains, the smaller binding material is soon washed out, leaving loose stones no longer capable of coherence. On the other hand, excessive drought has the effect of loosening the surface of sandy or flinty roads, which then become a constant source of trouble and expense in certain localities. On account of this inequality there is generally some difficulty in estimating the amount of wear and the quantity of material necessary to repair the damage and restore the surface to its proper shape and condition.

A rough estimate might be formed if the quantity of detritus, removed in the form of mud or dust, could be measured; but this is more or less impracticable. Moreover, the strength of a road is impaired not only by the loss of thickness in the road coating resulting from the removal of detritus from the surface, but also from the grinding action which may take place in the road itself, causing the larger materials to wear down gradually to a smaller size, especially in the case of weak and badly constructed roads. Observations of road sections, made by cutting trenches across the road, and estimating the amount of detritus in the road coating, have been systematically made by French engineers; but the results are of too complex a character to be of much practical use in this country. Perhaps the best index of annual wear is the quantity of broken stone consumed in the yearly maintenance of roads in localities where they are kept in proper condition. In France the average consumption is stated to have been, in 1876, as much as 78 cubic yards of broken stone per mile of road; but while some localities only required 22 cubic yards, in others as much as 390 cubic yards were found necessary.

In England there are not sufficient data available for arriving at even an approximate estimate under modern systems of supervision. The following examples for the year 1835 are given, not on account of their practical value at the present time, but as illustrating the wide variation which must always exist in different localities.

Annual Wear of Roads in Different Localities.

Locality.	Road Metal.	Cubic yards per mile.
Glasgow and Carlisle-road	Whinstone	60-120
Holyhead-road	Various	96-162
London Suburbs	Granite, Flint, Gravel	470-580
Edinburgh	Granite, Whinstone	500-600
Swansea	Mountain Limestone and Slag	500-800
Cardiff	Limestone	800-1,000
Glamorganshire	Limestone, Grit, and Slag	110
Carmarthenshire	" "	73
Pembrokeshire	" "	64
Cardiganshire	" "	56
Breconshire	" "	51
Radnorshire	" "	48

No statistics such as these can be considered as having any practical value unless it is certainly known that the materials have been properly applied, and the roads well maintained. We have already shown how road stone may be systematically wasted through ignorance of the real cause of defective roads.

Unfortunately, also, questions of economy, real or false as the case may be, have very often militated against the employment of the most suitable road-stone. The area of repairs has also been either too restricted, or proper discrimination has not been used in their selection. Thus a great deal of material is wasted or rendered inefficient from want of sufficient care in its application.

It will be useful, however, to examine the above table more closely in order to arrive at the real meaning of the quantities there given. The cubic content of one mile of road 4 yards wide and 1 in. thick is nearly 200 cubic yards. This amount of consolidated stone would represent nearly 400 cubic yards of broken stone, allowing 50 per cent. for the voids in the unconsolidated materials. If the stone is broken to a 2-in. gauge, and evenly spread, about twice the above quantity will be required to cover a mile of road one stone thick. In the above table, therefore, the consumption of materials is sometimes more than equal to a complete covering of the whole road, once a year, one stone thick. Owing to the unevenness of wear, however, this uniformity of repair is not required. In a mile of road there will be hollow places where a greater thickness of covering is required, and other places where the wear has been inappreciable, and renewal of the surface is unnecessary. For strict economy, therefore, the broken stone is laid only on the weak portions of the road.

This method, which is sometimes called *patchwork repair*, is still largely adopted throughout the country; but it is gradually

being replaced by the more modern process called *general recharging*, to be presently described. As the latter to some extent includes the former method, it will be well to consider first of all the patchwork process.

Patchwork Repair.—The prevalent practice of repair, in the old days before the advent of the steam roller, consisted in waiting until the road had completely lost its shape, when a thick coating of metal was spread over a large surface, and the loose stones were left for the traffic to consolidate. No method could be more extravagant of material; for not only was a large portion of the stone crushed and ground to powder by being rolled about under the traffic during consolidation, but also even after consolidation the surface was still as much out of shape as before.

A better result is obtained by laying the new stone only in small patches where the hollows occur, thus bringing up the surface to its proper contour. Such patches, even if left to be worked in by the traffic, have a much better chance of consolidation, with a minimum of inconvenience to the public, than if large spreads are laid down indiscriminately over certain lengths of road. For this reason Trésaguet advocated the system of *continual repair*, which consisted essentially in preventing the formation of ruts and hollow places by continual attention to the road. It was soon found that this system effected a saving of nearly 40 per cent. in the cost of maintenance, with the additional advantage of better roads at all seasons of the year. Prevention was the secret of success. Ruts and hollows, when once formed, quickly deepen; water collects in them, and the adjacent parts become soft, and are then easily cut up. If, however, the ruts are filled up as fast as they begin to form the surface is always maintained in good condition.

The method consists, therefore, in depositing the broken stone in road-side depôts, about 100 yards apart, and having one man to look after and repair every two or three miles of road. He is provided with the necessary implements, consisting of broom, hoe, pick and shovel, wheelbarrow, water-pot, 14-lb. rammer, and a 4-lb. hammer, and his duties are :—

1. To remove all dust in dry weather.
2. To scrape off all mud in wet weather.
3. To keep the surface drainage in good order by removing standing water from depressions and filling them up with fresh material.
4. To replace the wear by a gradual renewal of the covering in wet weather.
5. To fill up all ruts as fast as they form.
6. To keep ditches, gutters and culverts in repair.

The amount of material required for this purpose varies between 200 and 600 cubic yards per mile per annum, according to the quality of the road metal, the quantity of traffic and the width of the roadway.

A great advantage of this system is the individual responsibility of each man as regards his section of the road, thus ensuring his attention to his duties and the detection of any neglect. In filling up the ruts it is not enough simply to rake stones into them. The affected part should be cut out square, and then refilled with clean broken stone to a height slightly above the level of the sides. If the area is small consolidation can be assisted by the rammer, otherwise it can be rolled in the usual manner.

In the case of hollows some care is necessary in properly defining the limits of the area requiring repair. These should be carefully examined as soon as possible after heavy rain. In general they will be found to be oval in shape, deep in the centre and shallow at the margins. Scarcely ever are they in the rectangular form in which, for the sake of neatness, the new stone is often spread. Rectangular patches of newly-laid stone must, therefore, mean one of two things. Either a waste of material, due to covering more than the limits of the worn area; or imperfect repair, some parts of the hollow being left uncovered. An oval patch, as pointed out by Mr. Codrington, is not only more in accordance with the shape of the hollow portion which it is designed to mend, but is better for the traffic, there being no square corners to become displaced, and surface drainage is more easily diverted away from the patch. It will also, when consolidated, reconstitute the proper contour of the road surface more effectually than a rectangular one if the stones are skilfully spread and the smaller material laid on the margins.

A great deal of difference of opinion exists as to the advantage of loosening the surface by picking before spreading the new metal. The object of such a course is to enable the new stones to become more completely incorporated with the old material. This proceeding, although recommended by Macadam, was condemned by Parnell as wasteful of the old materials and of no advantage to the new. It was maintained that it is not good to destroy a portion of the solid layer, which has already become compact, for the questionable advantage of securing a better union of the new stone with the old. On the other hand, many road constructors hold strongly to the opinion that hollow places should be completely excavated to a uniform depth, the stones being sorted and cleaned, and then relaid, with the addition of new metal to restore the proper shape to the surface. Others, again, adopt the middle course of picking furrows on the margin of the patches only, in order to prevent the spreading of the new stone beyond the area of the patch. In deciding which of these methods should be adopted it is necessary to consider all the circumstances. A great deal depends upon the thickness of the road coating. If this is very thin, picking will break it up entirely, which will more than neutralise the effects of the repair and make the road weaker than it was before. Then again a great deal will depend upon whether consolidation of the patch is effected at once by the steam-roller, or whether it is to be left to the traffic alone. In the latter case complete incorporation of the new stone can generally be secured by spreading it in wet weather, when the roads, and especially the hollows, where the patches are required, are already sufficiently soft to enable the new stone to be worked in without excessive crushing. Round the margin of the patch a slight loosening of the surface to a small depth, taking care that the crust is not penetrated, is advantageous; while if the road covering is thick and the surface hard, the whole area may be picked, and a large amount of crushing of the new material avoided.

Again, it is sometimes the case that an old road contains so thick a covering of good stone that it only wants levelling up to form an excellent road without the addition of any new metal. Or the road may be so full of hollows that patches are out of the question, the entire length of the roadway requiring repair. In either of these cases, the whole of the old surface should be picked over and the loosened material raised to the proper contour. If new metal is required, a layer one stone thick will generally be all that is required. In all patchwork repairs the mud should be carefully scraped off the surface before the repairs are begun. It is a mistake to lay new metal on a muddy surface for reasons already pointed out in the discussion of the use of binding material. If binding material is required at all it should be added, in small quantity only, after the newly-laid stones are partially consolidated by rolling.

It is often thought that when once the new materials are laid it is not necessary to trouble further about the road until the time arrives for the next season's repairs. This is a great mistake. Both labour and material can be saved by a little attention to newly-laid patches, such as raking the stones into the incipient ruts which generally appear in the early stages of consolidation, and which, if neglected, will only be gradually deepened as successive vehicles follow in the same track. Loose stones, also, are easily displaced and spread beyond the surface of the patch under repair. These should be carefully put back into their proper places to avoid both waste of material and danger to traffic resulting from loose stones lying about on the road.

All the operations of patchwork repairs are materially assisted by the employment of the steam roller, the more modern forms of which are generally provided with special contrivances for scarifying or loosening the surface when necessary.

In those localities where steam rollers are not available, and there are still many such in different parts of the kingdom, great care must be exercised in patching. Where many hollows occur in a short distance, they should not all be covered simultaneously with new metal. A selection should be made so that a winding track, free from stones, may be preserved for horses' feet. Every patch causes a certain amount of diversion of traffic, and it is often possible, by judicious arrangement, to cause the traffic to take such a course that, while the horse may travel on hard roads, the wheels may gradually effect consolidation in as easy and unobjectionable manner as possible. The most usual course is to patch alternately on each side of the road, in a kind of chess-board arrangement, the intervening spaces being left until the others have become nearly consolidated.

Deep ruts, long neglected, may appear to require long strips of new stone along the wheel track. The result of repairing these in long sections is to form another rut alongside the repaired strips, since any long strip of repair, whether in the wheel track or in the centre of the road, is certain to be avoided by traffic as far as possible, causing the bare places to be broken up before the patches have become consolidated.

It is only on steep gradients that long strips of repair are permissible, one side of the road at a time; since in this case, although ascending traffic will avoid the stones, descending vehicles will run over them to check their velocity, and will thus effect their consolidation.

In the absence of the steam-roller also, imperfections are not seldom due to the repairs having been performed at the wrong time of year. New stones will not consolidate under traffic unless the road surface is sufficiently softened by wet. Autumn and early winter are generally the most favourable. Severe frosts, in this country, rarely set in until the winter is well advanced; and both frost and the dry season of spring render consolidation difficult, if not impossible. All loose stones which have not become incorporated in the road when the dry weather begins should be raked off the surface.

One great danger in the system of continual repair, as formerly practised on the Continent, is the liability to neglect altogether those portions of the road which retain a smooth, hard surface in spite of their wear. Such roads, without developing hollows, must necessarily diminish in thickness uniformly. If their strength is not kept up by replacing an amount of new material equal to that which they lose, they are liable to break up suddenly, and, in that case, to need complete reconstruction at a great cost. Sir J. Burgoyne pointed out this evil of the French system. By elaborate patchwork repairs, the surface of the French roads was maintained in an excellent condition. The smallest depressions were at once filled in and consolidated. Sweeping and scraping was resorted to continually to remove all detritus But although a level surface was thus secured, the thickness of the road coating was not maintained. Economy of material was effected at the cost of the road covering, which at length suddenly collapsed from sheer want of thickness, but without ever exhibiting any surface inequalities.

General Recharging.—This result is obviated by the more elaborate method of repair which is now gradually being adopted. The principle of this process is as follows :—Just sufficient is done annually to keep the surface in good order, and as soon as the road coating has worn thin a thick coating of metal is laid uniformly over the whole surface, and consolidated at once by the steam-roller. This method is an immense gain from the point of view of convenience for traffic. The road is always maintained in good condition, and when recharging is necessary everything is done to hasten consolidation. The surface is loosened, artificial watering is resorted to, and binding material is used when necessary, the repair being done at any season of the year. For general recharging the metal should be spread in layers not less than 4 in. thick, and the same care is used as in the construction of a perfectly new road. Care must, however, be taken not to spread more metal than can be completed in one day's rolling. Half the roadway may be coated, rolled, and finished before the other half is touched.

The success of this method depends upon the attention which is bestowed upon the road in the intervals between the periods of recharging. Weak places are almost certain to develop, and a certain amount of patching will be necessary to maintain a smooth and even surface. But if these are attended to periodically a great saving will be found to result from this method, and the rapidity of wear is so greatly diminished that several years may elapse before another recharging is necessary. It is true that all parts of the road will not wear equally, and the weaker portions may require recharging before the other parts. Such

weak spots can, however, be temporarily strengthened by a thin layer of new material, spread in wet weather and lightly rolled; by which means they are maintained in good condition until the time arrives for general re-charging of the whole road. The plan of general recharging in thick coats is especially applicable to roads subjected to heavy traffic. On such roads patch-work repairs in thin layers would involve such continual attention as to be not only wasteful in economy, but extremely inconvenient.

GENERAL BUILDING NEWS.

CHURCH, HEYWOOD, LANCASHIRE. — On the 30th ult. a new church for the parish of All Souls, Heywood, was consecrated by the Lord Bishop of the Diocese. The church consists of nave and aisles, chancel, morning chapel on the south side, north transept—forming choir, vestry, and organ chamber—and clergy vestry. A heating cellar is provided under the north transept. The chancel terminates in an apse at its eastern end, and its roof is vaulted in brick and stone. The church affords accommodation for 450 worshippers. For the present chairs will be used, but it is hoped eventually to furnish the church with oak seats. The roofs are of red deal, stained and varnished, and covered with green Cumberland slates, and the doors and other fittings are of English oak. The floors are of pitch pine wood blocks on a concrete foundation throughout the church, except in the chancel and morning chapel, where black and white marble and tiles have been used. The band of plaster below the clearstory windows of the nave is intended to be decorated in colour when funds admit. The church has been designed and built under the superintendence of the architect, Mr. Frank P. Oakley, of Manchester. The contractors for the whole of the work have been Messrs. Blakeley & Wild, of Hopwood. Mr. James Berry has acted as clerk of the works from start to finish. The heating, lighting, and plumber's work have been carried out by Mr. Jos. Fowles, of Heywood. The chancel and morning chapel floors have been laid by Messrs. Conway & Co., of Manchester.

CONGREGATIONAL CHURCH, MEERSBROOK, SHEFFIELD.—This new church was opened on the 21st ult. The building is situated at the corner of the Chesterfield and Beeton-roads. The terrace on which it stands is approached by a flight of stone steps. The church is 67 ft. long and 46 ft. wide, with a shallow transept on each side. The main entrances are in the Chesterfield-road front, and these lead into a vestibule 31 ft. by 8 ft, communicating with the church by two doors. At the end of the church opposite these entrances is the rostrum and a recess 23 ft. by 13 ft. for the choir. At the side of the choir recess is the space for the organ, and access is obtained to this from a porch in the Beeton-road front, which also provides a side entrance to the church. On the other side of the choir recess are the vestries, consisting of a deacon's vestry and a minister's vestry, placed side by side with the church. Facing Chesterfield-road is the church-room, 24 ft. by 20 ft. The buildings are faced with Meadow Head pressed bricks, with Matlock stone dressings, and the roof is slated. The style is Renaissance. The architects are Messrs. Hemsoll & Paterson, Sheffield. The church accommodates 550 people, and thirty-six additional seats are provided for the choir. The contractors were: Masonry and bricklaying, Mr. H. Turton; joinery, Mr. J. H. Hodkin; slating and plastering, Messrs. Hodkin & Jones; plumbing, Messrs. J. Snowden & Son; painting, Messrs. J. Puttrell & Co. The building is heated by hot water on the low-pressure system, Messrs. W. Truswell & Son being the engineers. The cost of building and furnishing the church has been about 3,900*l.*

CONGREGATIONAL CHURCH AND SCHOOLS, LEEDS.—New Congregational Church and Schools are to be erected in Woodhouse-lane, Leeds, for the church and congregation of East Parade Chapel. The church, of stone, will be capable of seating 800 worshippers, and will comprise a wide nave, with narrow aisles, transepts, and apse. The latter will be appropriated to the use of the choir, with organ-chamber at one side. At the junction of the streets an open porch is placed. This forms one of the main entrances, leading to a vestibule, over which is placed a seven-light traceried window terminating in a gable, with small turrets at the angles. At the junction of the nave and transepts next Woodhouse-lane, the tower, with spire, rises to a height of 130 ft. In the lower stage of this is another main entrance. The aisles are divided from the nave by stone columns with arches, over which are the clerestory windows. At the end of the apse is another seven-light traceried window, which is intended to be filled with stained glass. Provision will be made for the erection in the future of galleries in the transepts, these to be approached by staircases and wide corridors connecting the church with the schools and vestries. The school or lecture-hall is 64 ft. by 34 ft., placed at the top portion of the site, with boys' and girls' entrances from Woodhouse-lane—one on each side of the main gable, which will contain a five-light traceried window and angle turrets. Opening out of the school-room, eight class-rooms are arranged. The two larger ones are situated so that they can be thrown into the school-room when required, by means of patent folding partitions. A ladies' parlour, pastor's and deacons' vestries, infants' rooms, and the caretaker's residence face Hillary-place. The estimated cost of the buildings, including furnishing, but exclusive of land, is 13,500*l.* The architect is Mr. G. F. Danby, Leeds.

METHODIST CHURCH AND SCHOOLS, BLAYDON, DURHAM.—A new Methodist Free Church and schools, at the corner of Shibdon-road, and Lucy-street, Blaydon, were opened on the 29th ult. The builders were Messrs. Davidson & Bolam, of Blaydon, and the architects Messrs. Bowman & Nicholson, of Newcastle.

COTTAGE HOSPITAL, SKIPTON, YORKS.—The new district hospital at Skipton, erected as a Diamond Jubilee memorial, was opened on the 28th ult. The architect was Mr. Edward C. H. Maidman, of Edinburgh.

WASHHOUSES, GLASGOW.—The new public washhouses erected by the Corporation in Stobcross-street were opened recently. The plans were prepared and the work of construction carried out under the superintendence of Mr. A. B. Macdonald, City Engineer, the contractors being Messrs. R. Murdoch, mason; D. Sharkie, joiner; M. Sproul, plumber; J. M'Farlane & Co., engineers; Hamilton & Co., cement work; J. Lindsay & Son, painters; J. Munday, smith; Wm. Wilson & Co., boiler; Watson, Laidlaw, & Co., hydro-extractors. The cost has been about 5,000*l.*

BUSINESS PREMISES, EDINBURGH.—New show rooms in connexion with the Cockburn Hotel are to be erected between the hotel and Craig's-close. The architect is Mr. J. G. Adams, of Edinburgh.

SANITARY AND ENGINEERING NEWS.

HOYLAKE AND WEST KIRBY WATERWORKS.—The original works, which were commenced in 1878, consisted of a well sunk on the highest part of the Hoylake and West Kirby Gas and Water Company's property, 7 ft. 6 in. in diameter and 243 ft. 6 in. deep; an engine and boiler-house; an engine and pump capable of lifting 20,000 gallons of water per hour; and an uncovered reservoir holding 600,000 gallons. In 1880 Mr. Charles H. Beloe, M.Inst.C.E., was appointed engineer to the company. The demand for water increased so rapidly that in 1887 it was found necessary to increase the yield of the well by sinking a bore-hole 8 in. in diameter from the bottom of it to a depth of 168 ft. 6 in., or 412 ft. below the engine-house floor. The yield of water was thereby greatly increased; but it soon became evident that the pumping power was not sufficient to cope with the demand, and accordingly in 1889 another well, 9 ft. by 7 ft. and 221 ft. deep, was sunk at a distance of 200 ft. from the original well at a lower part of the ground. Another engine and boiler-house was built over the well. Great difficulty was experienced in driving a heading between the two wells by means of which either engine can pump from either well, and a large quantity of water was met with in the course of the construction of this heading, an important feeder being cut through. In 1898 it was felt that the original engine was getting worn out, and after carefully considering various proposals submitted to them by their engineers, Messrs. Beloe & Priest, the directors adopted the tender of Messrs. Simpson & Co., Limited, London. The old engine-house has been entirely remodelled, the boiler removed, the chimney pulled down, and the building adapted to receive the new engine. The contractor for this work was Mr. Charles Burt, Liverpool. In order to guard against any interruption of the supply through a breakdown of No. 2 engine, the old engine was kept in its place while the new one was being erected and the alterations effected in the house. A conduit (executed by Mr. Joseph Price, of West Kirby) was made between the two establishments, in which a steam-pipe was laid from the old boilers, and this enabled the old engine to be worked in emergencies, a provision which proved most useful on several occasions, and the old engine was not removed until after the new one was completed and the work in the well of fixing the new pumps had to be taken in hand. The new machinery consists of a compound horizontal tandem surface condensing engine driving a set of deep well pumps direct with well crank, and capable of lifting 60,000 gallons of water per hour from the well, which is 243 ft. 6 in. deep, into the reservoir. The engine is compound, with high pressure and low pressure cylinders, 17½ in. diameter and 27 in. diameter respectively, by 36 in. stroke, and provided with a heavy flywheel 13 ft. in diameter. The tail-rod is connected with the bell crank, which works two single acting bucket pumps "working opposite," so as to equalise the weight and flow of water. The pump-heads are supported on girders above the highest water-line, and the working barrels hang from the pump-heads down the well, so that any part of the pump below water can be drawn up for examination and repair. At the pump-heads the water is discharged into one delivery main with a large air vessel, and then passing into the reservoir through the surface condensor, by which means a perfect vacuum is obtained. The buckets are of cast-iron, of great length in proportion to the working barrels, and without any packing rings, and the valves of the double-beat type, with ample and easy waterways, and so designed and weighted as to act promptly and without concussion. The pump rods are of solid wrought-iron, secured together with wrought-iron screwed and clamped socket joints of new and special design. The steam is supplied to the engine from boilers in the lower engine-house, the steam pipes being laid in a covered conduit connecting the two houses, already described. By this means the cost of carting coal to the upper house will be avoided, and all the stoking will be in one place, whichever engine is being used. The company has thus at its command engine power capable of lifting 100,000 gallons per hour, or nearly 2,500,000 gallons per day of twenty-four hours. This is likely to be adequate for the requirements of the district for some time to come*, but the directors are now applying for powers to enable them to construct another reservoir, capable of holding 2,000,000 gallons of water, and a water-tower, 66 ft. in height, and also to sink another bore hole from the bottom of No. 2 well to any required depth. By this means, in the opinion of Mr. Morton, geologist, who has been consulted by the directors, a large additional quantity of water can be procured.

FOREIGN.

FRANCE.—The Paris authorities have caused all the trees removed from the Quai d'Orsay, during the progress of the new railway constructions there, to be replanted.——A monument to Louis Venillot, political writer, has just been inaugurated in the Church of Sacré Cœur at Montmartre. M. Fagel is the sculptor, and the monument consists of a bust of Venillot flanked by two figures symbolising "Gentleness" and "Faith."——The Chamber of Deputies is occupied with a scheme for the rebuilding of the Museum of Decorative Arts, the Conservatoire of Music, and the Luxembourg Museum.——An interesting exhibition of pictures and lithographs by M. Gottlob is on view in the Rue Bonaparte. The exhibition of the Société Internationale is open in the Georges Petit Gallery till the 31st inst. The exhibition of the new "Société des Peintres et Sculpteurs" will be held in the same gallery, from the 11th to the 31st March next year, and the annual exhibition of the Pastellistes will open on April 1.——The Municipality of Marseilles are about to spend a large sum, estimated at 58,000,000 francs, on the sanitation and rebuilding of the extensive quarter surrounding the Bourse.——The Municipality of Lyons is also about to undertake some improvements in the St. Paul district of that city.——A new central post and telegraph office is to be shortly commenced at Angoulême, at a cost of 280,000 francs.——The town of Evreux is to have a municipal theatre, to be commenced shortly.——The death is announced, at the age of seventy, of M. Leroux, architect, of Paris, who had built various schools as official commissions. He had received medals at the Universal Exhibitions of 1867, 1878, and 1889.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—The Manchester Laundry Engineering Company have sold their business to the Cherry Tree Machine Company, Limited, who have for some time manufactured most of their machines. All communications must in future be addressed to the Steam Laundry Department of the Cherry Tree Machine Company, Blackburn.——The Gloucester Railway Carriage and Wagon Company announce that they have closed their City office, and that all communications must be addressed to Gloucester, or to No. 1, Victoria-street, S.W.

THE GRAMMAR SCHOOL, CIRENCESTER.—Messrs. Waller & Son, of Gloucester, have been appointed architects for some additions that are to be made to the school buildings. The Grammar School was founded *temp.* Henry VII., by Ruthall, Bishop of Durham, in his native place, and augmented by Queen Mary. Dr. Jenner ranks amongst its famous pupils.

NEW PUBLICATIONS.—Messrs. Smith, Elder, & Co. are about to publish, under the editorship of Miss Pitcairn, a work which, under the title of "Unwritten Laws and Ideals of Active Careers," will consist of a series of essays upon the principles that obtain in various avocations, and guide the aims of those who follow their several callings. Mr. Alfred Waterhouse is the author of the essay upon "Architects," that upon "Artists" is by Mr. G. F. Watts.

THE LEEDS YORK-STREET INSANITARY AREA.—Sir Hugh Owen, G.C.B., of the Local Government Board, sat at the Leeds Town Hall recently to assess the amount to be paid by the Corporation for the compulsory acquisition of several lots of property in the York-street insanitary area. In the first case Mr. Thomas Whittaker claimed 150*l.* in respect of a small piece of property in Off-street, adjoining the North-Eastern Railway. The Corporation, for whom Mr. A. W. Bairstow appeared, had offered 60*l.* Mr. Thomas Winn, architect and

* The maximum quantity supplied at present is about 500,000 gallons per day.

surveyor, was the principal witness for the claimant, and his valuation was 121*l.* On behalf of the Corporation Mr. J. M. Fawcett, architect and valuer, put the value at 58*l.* 10s., and Mr. W. S. Braithwaite, architect, at 55*l.* 16s. Evidence as to repairs was also given by Mr. C. Myers, builder and valuer. The Arbitrator next inquired into the claim of the trustees of Mrs. Alice Stallworthy in regard to scheduled property in the Rising Sun-yard, off Marsh-lane. The trustees had formally asked for 450*l.*, and the Corporation made an offer of 255*l.* Mr. J. W. Heeles, estate agent, who was called on behalf of the claimants, gave a valuation of 379*l.*, and Mr. S. Whitham 393*l.* 19s. 8d. For the Corporation Mr. J. M. Fawcett estimated the value to be 230*l.* 15s., and Mr. E. J. Silcock, surveyor, 243*l.* The arbitration proceedings for the present terminated, and in due course Sir Hugh Owen will make his awards.

THE FIREPROOFING OF TIMBER.—On Monday last a paper on "The Fireproofing and Preserving of Timber" was communicated to the Society of Chemical Industry by Mr. Sherard Cowper-Coles. Owing to the unavoidable absence of Mr. Cowper-Coles, the paper was read by his representative. A number of lantern slides showing the appearance of various woods in vertical and transverse section were exhibited. Attention was drawn to the difference in the size of the cells in the different varieties of timber, and the difference between winter wood and spring wood, and one or two slides were shown which admirably demonstrated the partial filling up of the cells with crystalline matter in timber which has been "fireproofed" with a crystallisable salt. Mr. Cowper-Coles has not, unfortunately, succeeded in discovering any entirely satisfactory material with which to render timber non-flammable, for all his experiments have yielded results of a more or less negative character. The main difficulty appears to be due to the fact that the soluble salts most effective in rendering the timber fireproof are gradually washed out of the wood when used for external work or for ships, and that in the course of time the timber entirely loses its fireproof qualities. Presumably, also, the same objection applies to all internal woodwork which is periodically cleansed by scrubbing. Again, phosphate of ammonia and some of the other salts commonly employed for fireproofing, give the timber with which it is treated a corrosive action upon iron and other metals which it did not previously possess, and consequently detracts considerably from the general utility of the wood. A brief review was made of the numerous processes for preserving and fireproofing timber which have been introduced during the last fifty years, and Mr. Cowper-Coles stated that in spite of the contrary expressions of opinion which had been published, his experience indicated that it was almost impossible to efficiently fireproof timber without first "steaming" it for several hours. Moreover, the time required for impregnating the timber with a fireproofing solution varies greatly with the variety of the wood. Although reference was made to all the most popular methods of treatment now in vogue, very little criticism of the individual processes was offered. It was stated that the cost of fireproofing timber by the electrolytic process was less than one-fifth of a penny per cubic foot, but the description of the process itself was very meagre. A somewhat animated discussion took place after the reading of the paper, especially with regard to the use of ammonium phosphate. It was admitted that this salt is apt to corrode metals placed in contact with it, and the general opinion appeared to be against, rather than in favour of, the employment of this substance in the treatment of timber. Mr. Watson Smith stated that at the Manchester Jubilee Exhibition the match-wood and lighter wooden articles were treated with a solution containing equal parts of salammoniac and boric acid. During the period of the exhibition ten outbreaks of fire occurred, but no serious damage was done. The fact that none of the fires attained alarming proportions was ascribed to the non-flammability of the light woodwork, which rendered impossible any conflagration sufficiently fierce to thoroughly ignite the heavy untreated timber. Although it was admitted that fireproofed timber is not as a rule so strong as the untreated wood, no figures were given to show the effect of the different methods of treatment upon the strength and durabilty of timber.

RAILWAY SURVEYORSHIP APPOINTMENT. — Mr. Douglas Young, F.S.I., of the firm of Messrs. Douglas Young & Co., Coleman-street, E.C., has been appointed Surveyor to the North-West London Railway. This is a new line running from the Marble Arch (where there will be a connecting interchange with the Central London Railway) and thence along the Edgware-road to Cricklewood, the line being four miles in length, with eventual developments north and south of a very important character.

LECTURES ON ORNAMENTAL DESIGN.—A course of twenty lectures on ornamental design will be delivered in the theatre of the Victoria and Albert Museum, South Kensington, by Mr. Lewis F. Day, at 11.30 a.m., on the following Fridays:—January 5, 12, 19, 26; February 2, 9, 16, 23; March 2, 9, 16, 23, 30; April 20, 27; May 4, 11, 18, 25; June 15. The lectures will have special reference to surface decoration and pattern design, and will be illustrated by objects from the museum and lantern slides.

ANCIENT IRISH CROSSES.—At a general meeting of the Royal Irish Academy, held at the Academy House, Dawson-street, Dublin, on the 30th ult., a paper dealing with the high crosses of Moone (county Kildare), Drumcliff (county Sligo), Termonfeckin (county Louth), and Killamery (County Kilkenny), was read by Miss Margaret Stokes, Hon. M.R.I.A. Miss Stokes illustrated her paper with rubbings and drawings of the bas-reliefs, &c., of the crosses. She said the four crosses varied in height considerably; that of Moone measured 17 ft. 6 in.; the cross of Drumcliff was 13 ft. high; that of Termonfeckin 8 ft. 6 in.; and Killamery 12 ft. There were forty-nine sculptured panels on the face and sides of the Moone cross, and forty-one on that of Termonfeckin, the cross being of silicious sandstone; whilst there were thirty-six on the face and sides of the Drumcliff cross, and forty-one on that of Killamery. There were thus 167 panels containing illustrative or descriptive designs, and the most important one was that known as the trumpet pattern. It fell into disuse about the year 1050, and was found on the late Celtic and pre-Roman works of Britain. During the Roman occupation it was extinct in Britain, but lived on in Ireland. It consisted in two lines wound round a spiral, and the last appearance of this Celtic spiral in manuscript illumination was dated 951, and its last appearance in metal work was in 1023. Interlacings occurred three times in the Drumcliff cross, four times on the Termonfeckin one, and twice on that of Killamery. Regarding what the sculptures dealt with, the lecturer mentioned there was the Fall of Man on the Drumcliff and Killamery crosses, and then came the Death of Abel. On the Moone cross they had the Three Holy Children and the Sacrifice of Isaac, and nothing could be more beautiful than the manner in which the angels' wings were represented—they were transfigured from the flames. Birds and swine and dolphins appeared on the Moone cross. But perhaps the most interesting pieces of work were the two on the west face of the Killamery cross, representing a stag hunt and a procession, which latter might also be seen on the cross at Kells. Irish monumental art was by this connected at once with the art of the sarcophagi of Gaul. She hoped to accomplish the task of the illustration of the high crosses of Ireland. On the motion of Dr. Joyce, seconded by Mr. Cooke-Trench, the paper was referred to the Council for publication.

THE VALUE OF CREOSOTE.—Mr. E. J. Silcock, A.M.Inst.C.E., Leeds, delivered a lecture on the 4th inst., before the members of the Yorkshire College Engineering Society, on "Creosoting Timber." His paper might appropriately have been entitled "The Life of a Telegraph-pole," for he described in detail the treatment these useful but not very sightly objects require for their preservation. Decay in timber is brought about in three ways—by the action of bacteria in the albumen in the sap, by the absorption of water, and by the action of insects. It is calculated that an ordinary fir telegraph-pole without any chemical preparation will become rotten in seven years. In 1848 318 creosoted poles were erected between Fareham and Portsmouth. In 1861 they were examined, and only two showed the slightest trace of decay, and these were replaced. In 1883 the poles were still in use, and apparently were quite sound. In 1861 forty miles of poles were fixed between Yeovil and Exeter. By way of an experiment, they were arranged in threes, the first in each trio being a plain pole, the second one had been boucherised, and the third had undergone the creosoting process. In 1870 all the plain poles had been removed, 30 per cent. of the boucherised poles were exhausted, while the whole of the creosoted poles were sound. Mr. Silcock explained in detail various processes of creosoting, and concluded by recommending creosoting as a cheap and effective process of preserving timber.—*Leeds Mercury.*

STAINED GLASS. — An interesting lecture on "Stained Glass" was delivered by Mr. Lewis Day at the London Institution on Monday last. The lecturer described how a stained-glass window could be made, and how, in his opinion, it should be made. By a stained-glass window he meant, primarily, glass work—a mosaic of pieces of glass held together by an open framework of lead. It was as much a mosaic as a Roman pavement, except that it was not marble, or any opaque substance, but translucent glass. It was to *cloisonné* enamel that stained glass in its simplest form was most nearly allied. The lecturer's remarks were illustrated by a large number of excellent lantern slides.

SLATE TRADE.—Price lists for the coming year have been issued by the leading quarries, and show a general stiffening, but not sufficient to encourage the importation of foreign slates. Stocks are small and trade continues brisk, but loading has been delayed by the scarcity of railway trucks.

BOLTON MASTER BUILDERS' ASSOCIATION.—The twentieth annual meeting of the Bolton Master Builders' Association was held at the offices of the secretary (Mr. Vose), Chancery-lane, Bolton, recently, Mr. J. H. Marsden (President) occupying the chair. The Secretary submitted his Report for the past year, this document stating that during the period he had attended 126 meetings on matters connected with the various branches of the trade. It was also mentioned that the building industry had been fairly well engaged during the year, and labour had been plentiful, with the exception of the plasterers' branch, in which there was a deficiency of first-class men. The Report referred to various minor disputes in the plumbers', joiners', and stonemasons' sections of the trade; one peculiar feature of the latter difference being the refusal of the operative masons to accept the ruling of their own executive and also the decision of an independent chairman, this strike lasting for twelve weeks. Allusion was also made in the report to an objection raised in November by the operative joiners to certain work being done by cabinet makers which they (the joiners) contended belonged to them; an arrangement being come to which defined that only movable fixtures should be undertaken by the cabinet makers; where the work is of a "fixed" character—placed into a wall—it must be done by the joiners. A question of wages was involved in this matter, the two branches being paid on different scales. Some minor disputes connected with the joiners had also been amicably settled during the year. The masters have at present under consideration a demand from the operative joiners for an increase of wages to the extent of ½d. per hour and a reduction of one hour's time a week, this notice expiring next May. Attention was called in the report to the circumstance of the Corporation of Bolton still maintaining competition with local tradesmen and employers in regard to certain productions, this being considered unjust by the Association, and it was deemed essential that some action should be taken with a view to securing the abolition of the practice. The report likewise mentioned that notice had been received from the Wood Sawyers and Mill Machinists' Society for an increased rate of wages by ½d. per hour and also an alteration of time working; this notice, which expires in May, 1900, is now occupying the attention of the employers. Fifteen new members had joined the Master Builders' Association during the last year. Thanks were accorded to the retiring officers and Committee for their past services. Councillor D. Maginnis was appointed President for the ensuing year, Mr. Benjamin Talbot being elected Vice-president, and Mr. R. W. Kenyon Treasurer (these being all new officers). A Committee was also constituted, most of the old members being re-appointed. It was decided that the annual dinner of the Association should be held on December 19.

LEGAL.

ACTION BY AN ARCHITECT FOR FEES.

THE case of Pye *v.* Fry came before Mr. Justice Ridley and a Common Jury in the Queen's Bench Division on the 30th ult., it being an action brought by Mr. G. G. Pye, an architect, against the defendant, Mr. C. H. Fry, to recover 188*l.*, the balance of an account of fees alleged to be due for preparing plans for the rebuilding of the Gresham Restaurant in Gresham-street, E.C.

It appeared that the defendant, who was the proprietor of the Gresham Restaurant in 1897, wished to rebuild, and on being introduced to the plaintiff instructed him to prepare the plans. The defendant desired to raise about 15,000*l.* upon the premises in order to pay off 6,500*l.* secured by mortgage upon them, and to meet the expenses of the new buildings, &c. The plaintiff's case was that the defendant asked him to procure loans of 10,000*l.* and 5,000*l.* to be charged as a first and second mortgage respectively on the premises. The plaintiff undertook to procure the 5,000*l.*, and said he would try to procure the 10,000*l.*, but expressed a doubt as to whether he would be able to do so. The plaintiff introduced the matter to Messrs. Bass & Co., the brewers, who entered into negotiations for lending the 5,000*l.* on a security of a second mortgage, but these negotiations fell through owing, as the plaintiff contended, to the fault of the defendant in not complying with the reasonable requirements of Messrs. Bass & Co. The plaintiff, in addition to this, found successively three other persons who, he alleged, were prepared to advance the 10,000*l.* upon the security of a first mortgage. All these negotiations, however, failed, and ultimately the defendant sold the premises as they stood for 8,000*l.* The defendant's case was that it was agreed between them that the plaintiff should only be entitled to be paid his fees if he succeeded in procuring the loan of 15,000*l.*

In the result the jury returned a verdict for the plaintiff and judgment was entered accordingly.

Mr. Atherley-Jones, Q.C., M.P., and Mr. Manley Smith appeared for the plaintiff, and Mr. C. C. Scott for the defendant.

AN IMPORTANT POINT UNDER THE LONDON BUILDING ACT, 1894.

ON the 1st inst., Mr. Horace Avory moved, before Justices Bruce and Bigham sitting as a Divisional Court of Queen's Bench, for a rule *nisi* on behalf of the London County Council, calling upon the magistrate at the Westminster Police-court to show cause why he should not state a case raising a point which the County Council desired should be raised under Section 74 (2) of the London Building Act, 1894. It appeared that a building-owner gave notice to the District Surveyor of his intention to erect a public-house, the ground floor of which was to be used for the public-house business and the first and second floors for residential purposes. A notice of objection that the building was not in

accordance with Section 74 (2) of the Act was served upon the building-owner under Section 150, from which notice the building-owner appealed to the magistrate. Section 74 (2) provides:—"In every building exceeding ten squares in area used in part for purposes of trade or manufacture and in part as a dwelling-house, the part used for purposes of trade or manufacture shall be separated from the part used as a dwelling-house by walls and floors constructed of fire-resisting materials, and all passages, staircases, and other means of approach to the part used as a dwelling-house shall be constructed throughout of fire-resisting materials." The Council's contention was that the proposed building was one "used in part for the purposes of trade" and "in part as a dwelling-house," within the meaning of the Section, and that that Section must be complied with. The magistrate allowed the appeal, and refused to state a case on the point raised by the County Council on the authority of the case of Carritt *v.* Godson, in which Justices Day and Lawrance held that a fully-licensed house was not within the Section. Mr. Avory pointed out that in the case of Carritt *v.* Godson the proceedings were criminal, and consequently the case could not be taken to the Court of Appeal. The present proceedings were not criminal, and the Council desired to obtain the opinion of the Court of Appeal upon the point.

In the result, a rule *nisi* was granted.

THE LIMPSFIELD BUILDING CASE.

The case of Leveson-Gower *v.* Sewell came before the Court of Appeal, composed of the Master of the Rolls, the President of the Probate Division, and Lord Justice Romer, on the 6th inst., on the appeal of the defendant from an interlocutory injunction, granted by Mr. Justice Darling in the Vacation Court, restraining the defendant until judgment, or further order, from erecting any house upon a piece of land at Limpsfield, Surrey, except in accordance with plans, specifications, and limitations to be approved by the plaintiff's architect. (The case was reported in the *Builder* of October 14, 1899.)

Upon the motion being called on, Mr. Alexander, Q.C., who appeared in support of the appeal, said that the case was on their lordships' paper about five weeks ago, and it then was arranged it should stand over, in order to see if a compromise could be effected. He was glad to tell their lordships that this had been done, and that plans had been approved, and buildings would be now erected by the defendant in accordance with those plans. With regard to the costs, Mr. Mulligan, Q.C. (appearing for the plaintiff), had met him (Mr. Alexander) very fairly, and it was arranged that the defendant should pay to the plaintiff 80*l.* towards his costs. In those circumstances, with their lordships' sanction, it was proposed to take an order in the following form:—"That, upon the defendant undertaking, in the terms of the interim order, and also undertaking to pay 80*l.* to the plaintiff towards his costs, the present appeal to be dismissed without costs, and all further proceedings to be stayed."

Mr. Mulligan: Yes, I agree to that.

The Master of the Rolls: Yes, that will do very well.

Order accordingly.

THE AUTHORITY OF CLERKS OF WORKS:

AN INTERESTING POINT.

In the City of London Court, on Tuesday, before Mr. Commissioner Kerr, an interesting question to the building trade was decided. The plaintiff, Mr. George Saunders, stone merchant, 37, Park-avenue, Edmonton, sought to recover the sum of 10*l.* 9s. 4d. for stone supplied to the defendants, The Great Eastern Land and Building Company, Limited, 2, Church-court, Clement's-lane, E.C.—Mr. Glasgow, plaintiff's counsel, stated that the plaintiff was a dealer in builders' materials, and the defendants were a company formed for the purpose of erecting streets of houses at Edmonton. The order for the goods sued for was given on October 7 last by Mr. Laite, the clerk of the works, who was employed by the defendants. The order was executed on October 11, and an invoice was sent in in the usual way. The defendants were now raising the point that the clerk of works had no authority to order the goods, although the defendants had paid for previous goods ordered by him. The plaintiff was called and said that the order for the goods sued for—York stone—came in the same way as those which had preceded it. When the stone was delivered, it was approved in the ordinary way by Laite. No objection was made as to the price. When he called for payment at the end of the week he saw Laite and the cashier, the latter of whom told him that he was short of money and that he would pay in a month. A little while afterwards Laite wrote him a letter asking him to invoice the stone to the defendant company instead of to him personally. In cross-examination the witness said that Laite was no friend of his. He had never had written orders given him. It was not true that he knew Laite only had authority to give orders for less than 5*l* without getting them ratified by the company. He knew that Laite was only the foreman, but he did not make any inquiries as to the extent of his authority. The witness, in answer to further questions, denied that the stone sued for was of bad quality, or unfit for the purpose for which it was required, namely, making manholes. It certainly was not true that similar stone could be bought for 6d., his price being 8½d. As a fact, he gave 7d. for it, and did the carting himself. Mr. Brandon, defendants' counsel, said his defence was that on all defendants' order forms it was clearly stated that no orders above the value of 5*l.* would be recognised unless they had the ratification of the company. Mr. Glasgow said that was not evidence against the plaintiff, as no written orders had ever been given. Mr. Brandon said that Laite was well aware of the limitation of his authority, and knew that he was exceeding it. Mr. Commissioner Kerr did not see that. Mr. Brandon said the principals could not be bound where a clerk of the works went out of his way to give orders which he had no authority to give. Mr. Thomas H. North, the chairman of the defendant company, said that Laite was distinctly told not to order any goods above the value of 5*l.* without the express authority of the company. No ratification was given for the order sued upon, and consequently he refused to pay. The first he knew of the order having been given was when the account was brought to him for payment. He told Laite to return the stone and informed the plaintiff that it was lying on their land at the plaintiff's risk. Afterwards he told the plaintiff that he would be charged 1*l.* per week as rent for use and occupation of the space which it took up. The stone was still on his premises. Laite had left the employment of the company. On the day Laite gave notice to go he wrote to the plaintiff asking to have the invoice sent in in the name of the company instead of his own. The witness admitted having paid for previous goods ordered by Laite. Mr. Commissioner Kerr said that showed that Laite had authority to order goods. Laite was called, and he said that in his view the necessity to have the ratification of the plaintiff's order did not apply in that particular case. For two years he had been giving orders for the defendants and he had never been spoken to before. He had given orders for as much as 40*l.* worth of goods to other merchants. Mr. Brandon submitted that the Sale of Goods Act precluded the plaintiff from recovering. The goods sued for were above the value of 10*l.*, and there had been no acceptance or part payment, nor was there any memorandum as required by the statute before the plaintiff could recover. Mr. Commissioner Kerr said there had been an acceptance.—Mr. Brandon: Not in the point of law.—Mr. Commissioner Kerr: The less law we have in this world the better. I find, as a matter of fact, that there was acceptance. You have got the stone, now pay for it.. Mr. Brandon said surely the Court would not hold that Laite had authority to give orders above the value of 5*l.* Mr. Commissioner Kerr said he would, and that an honest man did not consider whether it was 5*l.* or 10*l.*—Mr. Brandon: We do not want the stone. It is of no use.—Mr. Commissioner Kerr: So you say. I do not believe you. Judgment was given for the plaintiff for the sum claimed, as well as on the counter-claim which had been raised. Mr. Brandon asked for leave to appeal. The point was of some importance to the defendants. Mr. Commissioner Kerr refused leave, and allowed the plaintiff the whole costs of the litigation.

IMPORTANT LLANDUDNO BUILDING CASE.

The case of Warburton *v.* the Llandudno Urban District Council came before Mr. Justice Cozens-Hardy in the Chancery Division on the 5th, 6th, and 7th insts., an action brought by Mr. Samuel Warburton, a builder, against the Llandudno Urban District Council for damages for having ejected him from the site of the new municipal buildings at Llandudno which he had contracted to build, and for a loss of profit estimated at 15 per cent. 2,081*l.*

Mr. Astbury, Q.C., and Mr. Taylor, appeared for the plaintiff, and Mr. Eve, Q.C., and Mr. E. P. Hewett for the defendants.

Mr. Astbury, in opening the case, said the plaintiff was a builder who had been in the habit of putting up large buildings in many towns. The Corporation of Llandudo, wishing to erect municipal buildings, advertised for tenders, and the plaintiff's tender for 13,800*l.* was accepted. Before the plaintiff tendered he was furnished with a list of quantities, and there was a term in the contract that all additions and alterations, when they came to be paid for, should be made out according to the original estimates of the builder, and it was therefore necessary that the builder should keep his original quantity prices, but they were only to be kept for the purpose of pricing at the end of the contract. One of the conditions of the contract was that the contractor was to furnish the architects at the time of signing with a verified sealed copy of the original estimate. The plaintiff contended that it was not usual with builders in Liverpool and other large towns in the North of England to furnish a copy of the original estimate to the architect of the building. The plaintiff was put into possession of the site, he had spent money and time on the building, and then the defendants refused to let him go on with the work unless he allowed them to look at the sealed copy. The copy was not to be used until the additions were to be priced, so that the architects should not be able to choose additions which would be unjust to the builder. The plaintiff offered to allow the Town Clerk of Llandudno to verify the original estimate, but he would not do so, and the plaintiff thereupon refused to allow the surveyor to verify it, because it would be permitting it to be done by the person against whom it was to be sealed. The plaintiff was to be put into possession on January 1, 1899, and the work was to be concluded on June 30, 1900. The plaintiff undertook to find sureties for 2,000*l.* for carrying out the contract, and to furnish the architect with a verified sealed copy of the original estimate. Work was commenced on February 13, and the sureties were deposited, and a sealed copy of the estimate, verified by Mr. Lees, chartered accountant, was sent to the architects. On March 2 plaintiff received a notice that unless he furnished a duly certified sealed copy of the original estimate, the contract would be rescinded and the defendants would proceed against the plaintiff for damages. The defendants contended that the architects or their surveyors were the proper persons to verify the sealed copy. Defendants ejected the plaintiff from the site on March 13, and took possession of the building material and other property of the plaintiff, and had since continued in possession. The plaintiff claimed 2,081*l.* for loss of profit on the contract-work, estimated at 15 per cent.; 78*l.* 19s. for building material, &c., appropriated and converted by the defendants for their own use; and 500*l.* special damages.

Mr. Eve asked if those were moral and intellectual damages?

Mr. Astbury said it was for damages to the plaintiff's reputation in having been turned out of his job. The defence was that the defendants did not admit that the agreement was intended to be final or binding unless the plaintiff should furnish the architects with a sealed copy of the original estimate duly verified, which they said was not done, and that the contract was rescinded. Further they alleged that the plaintiff had revoked the contract, and that independent of the default of the plaintiff in reference to the sealed copy he had after the execution of the contract expressed his intention of disregarding other terms of the contract, and of not carrying out the works in accordance with the drawings and specifications. The defendants accepted the plaintiff's tender because it was the lowest, on the condition that he would not make any claim in respect of what he had done for them in the past. It was obvious that the defendants, from the correspondence which had passed, desired to get rid of the plaintiff.

Mr. Warburton, the plaintiff, examined, said he had been a master builder for nearly forty years, and had constructed works for the War Office, the Post Office, and various railways and corporations in the North of England. He tendered for the work in October, 1898, and obtained a bill of quantities from the defendants' surveyor. He received in due time a notice that his tender had been accepted, and at the end of November he received from the Town Clerk a copy of the contract. He insisted upon the word "sealed" being inserted in the paragraph relating to the furnishing of a copy of the original estimate to the architects. The original estimate was not required by persons employing a builder until the clearing up for alterations and additions, and there was no object for which the architect or surveyor could desire to see the estimate until the contract was completed. It was unfair that the architect or surveyor should see the original estimate before deciding what additions there should be. The copy which was furnished defendants was verified by Messrs. Lees, chartered accountants, and he was of opinion that that was a sufficient verification under the terms of the contract. The architects did not tell him that he was not to commence the work until the copy was furnished to them, but they pressed him to get on with the building. He put upon the site materials which cost him over 78*l.* He offered to allow Mr. Connolly, the Town Clerk, or Mr. Lockwood, of Chester, to verify the copy. In other works he had entered into he had never been asked to verify the copy. While he was on the property he was ready and willing to go on with the contract properly and reasonably, and he never refused to carry out any terms he was bound to carry out.

Cross-examined:

It was an uncommon thing to require sealed copies to be sent in with the tenders, but it was sometimes done. He objected to any quantity surveyor who had an interest in the building, or power to make alterations, seeing his prices and so been enabled to pick out the plums and leave the stones.

Mr. J. Holden, an architect and surveyor, said that in his experience there was nothing that the copy of the estimates could be required for, except for the purpose of adding up the extras at the end of the contract. He thought 500*l.* was a small amount to put down as damages and though 15 per cent. profit might be a reasonable sum, he could not say whether the plaintiff would have made so much.

For the defence Mr. Eve submitted that by the contract there was to be a verified copy of the original estimate, for the sole use of the architect and surveyor appointed. The object of that was

that it should be deposited in such manner that it should not be available for any one but the architect and surveyor.

His lordship asked what ground the defendants had for importing into the contract the assertion that the copy was to be verified by the architect or quantity surveyor?

Mr. Eve replied that that would be done for the protection of the employer. He submitted that there was never any verification within the meaning of the clause in the contract, and that the verification should be done, not by an accountant, but by the contracting parties.

Mr. Alfred Connolly, the Town Clerk of Llandudno, and the architect of the building were called for the defendants, the latter stating that, owing to the great rise in building materials, it was very doubtful whether plaintiff would have made a profit if he had completed his contract.

Other evidence having been given, counsel then addressed his lordship on the whole case.

His Lordship, in giving judgment, said he had come to the conclusion that the defendants were wrong and that the plaintiff had absolutely and entirely complied with every obligation under clause 3 of the contract when he sent to defendants the sealed copy of the original estimate verified and certified. He must therefore make the declaration which the plaintiff asked, and that upon the true construction of the agreement the defendants were not entitled to require that the verified copy of the sealed estimate should be further verified by the architects. It followed, therefore, that the defendants had been guilty of breach of their contract with the plaintiff. He thought the plaintiff's claim for 15 per cent. profit on the contract too high, and he gave him on that head 1,000*l.* damages. On the claim for 500*l.* special damage to reputation, he felt that it would be wrong to mulct the defendants in those damages. There would therefore be judgment for the plaintiff for 1,000*l.*, with costs.

Order accordingly.

MEETINGS.

FRIDAY, DECEMBER 8.

Institution of Civil Engineers.—Students' Visit to the Works of the Baker-street—Waterloo Railway, in course of Construction. (Assemble at the Works, near Charing Cross Railway Bridge, at 2.30 p.m.)

Glasgow and West of Scotland Architectural Craftsmen's Society.—Mr. D. Bennet Dobson on "Graphic Calculations." 8 p.m.

SATURDAY, DECEMBER 9.

Carpenters Company.—Examination in Sanitary Building Construction. *Viva voce* Exam. 12 noon.

MONDAY, DECEMBER 11.

Surveyors' Institution.—Adjourned discussion on Mr. P. E. Pilditch's paper entitled "Party Walls Under the London Building Act, 1894." 8 p.m.

London Institution.—Mr. Francis Bond on "Architecture and National Character." Illustrated. 5 p.m.

Society of Arts (*Cantor Lectures*).—Mr. H. H. Cunynghame on "Art Enamelling upon Metals." IV. 8 p.m.

Institution of Mechanical Engineers (*Graduates' Meeting*).—Mr. W. B. Cleverley on "Works Management: Methods of Quick Production of Repetition Work." 7.30 p.m.

Bristol Society of Architects.—Mr. C. B. Fowler on "Ancient Churches in the Diocese of Llandaff, together with Excavations in the Black and Grey Friars' Monasteries in Cardiff Castle." With lantern illustrations. 8 p.m.

TUESDAY, DECEMBER 12.

Institution of Civil Engineers.—Mr. C. Newton Russell on "Combined Refuse Destructors and Power Plants." 8 p.m.

Sheffield Society of Architects and Surveyors.—Professor T. Roger Smith on "Oriental and Indian Architecture."

WEDNESDAY, DECEMBER 13

Institute of Sanitary Engineers (*Incorporated*).—(1) Half-yearly general meeting for the election of officers for 1900. 4.30 p.m. (2) Annual Dinner, Duke's Room, Holborn Restaurant. 7 p.m.

Sanitary Institute.—Dr. Arthur Newsholme on "The Health of Scholars, with special reference to the Education Code and the Board of Education Act, 1899." 8 p.m.

Edinburgh Architectural Association.—Paper by Mr. F. M. Deas, M.A., entitled "Notes on Eleventh Century Buildings in South-Eastern Italy." Illustrated by limelight views. 8 p.m.

Northern Architectural Association.—Mr. Frank Baker, C.E., on "Canterbury and Winchester Cathedrals," with lantern illustrations. 7.30 p.m.

THURSDAY, DECEMBER 14.

Institution of Electrical Engineers.—8 p.m.

FRIDAY, DECEMBER 15.

Architectural Association.—Mr. Andrew Oliver on "Streets and Buildings of Old London." 7.30 p.m.

Institution of Civil Engineers (*Students' Meeting*).—Mr. Blamey Stevens on "Sludge." 8 p.m.

SATURDAY, DECEMBER 16.

Dundee Institute of Architecture.—Visit to Caird Hospital and Royal Bank Buildings. 2 p.m.

PRICES CURRENT OF MATERIALS:

WOOD.*

Per Petersburg standard hundred.

	£	s.	d.	£	s.	d.
White Sea: first yellow deals	18	0	0	21	10	0
Second do.	16	0	0	18	0	0
Third do.	13	10	0	15	0	0
Battens, 40s., 30s., and 15s. less respectively.						
Petersburg: first yellow deals	15	0	0	17	10	0
Second do.	12	0	0	13	10	0
Battens, 30s. and 20s. less respectively.						
Petersburg, white deals	10	10	0	12	10	0
Do. white battens	9	0	0	10	0	0
Riga, white deals	9	10	0	10	10	0
Swedish mixed yellow deals	16	0	0	18	0	0
Third do.	14	0	0	16	0	0
Fourth do.	12	0	0	13	0	0
Fifth do.	11	0	0	12	0	0
Battens, 30s., 20s., and 10s. less respectively.						
Whitewood, 10 to 20 per cent. less.						
Finnish unsorted yellow deals	11	0	0	11	10	0
Battens, 10s. and 5s. less respectively.						
Whitewood, 5 to 10 per cent. less.						
Norwegian second yellow battens	8	0	0	8	10	0
Third do.	7	15	0	8	0	0
Fourth do.	7	10	0	7	15	0
Whitewood, 10s. less.						
Danzig, Crown Deck deals, per 40 ft. 3 in.	0	15	0	1	5	0
Brack	0	12	0	1	0	0
St. Lawrence Pine deals, &c., per P.S.H.:—						
1st, Bright and Dry, regular sizes	20	0	0	27	0	0
" " oddments	13	0	0	20	0	0
2nd " regular sizes	15	0	0	17	10	0
" " oddments	10	0	0	14	0	0
3rd " regular sizes	9	0	0	11	0	0
" " oddments	7	10	0	9	10	0
4th " regular sizes	8	0	0	9	0	0
" " oddments	7	0	0	8	10	0
St. Lawrence Spruce deals, &c.						
First, regular sizes	9	10	0	12	10	0
Second "	9	0	0	9	10	0
Third "	8	15	0	9	0	0
Fourth "	8	0	0	8	10	0
Oddments and battens at 20s., 10s., 7s. 6d., and 5s. less respectively.						
New Brunswick Spruce deals, &c.	8	10	0	9	0	0
Oddments, battens, and fourths	8	0	0	8	10	0
United States pitch pine planks and boards	10	0	0	13	0	0
Prepared Boards, per square						
1¼ by 6½ and 7 in. 1st yellow		10	0		15	0
" " 2nd "		9	6		12	0
1 by 6½ and 7 in. 1st "		9	0		11	0
" " " white		8	0		9	6
" " 2nd yellow		8	0		10	0
" " " white		7	0		8	0
¾ by 6½ & 7 in. 1st & 2nd yellow		7	9		9	0
" " " white		7	6		8	6
¾ by 6½ and 7 in. 1st yellow and white (grooved, tongued, and beaded)		8	0		9	6
¾ by 6½ and 7 in. 2nd yellow and white (ditto)		7	6		8	6
⅝ by 6½ and 7 in. 1st yellow and white (ditto)		6	6		7	6
⅝ by 6½ and 7 in. 2nd yellow and white (ditto)		6	0		7	0
Narrower widths at 10 per cent. less. 3rd quality at 15 per cent. less than 2nd.						
Danzig and Memel Fir Timber— per load						
Best middling	3	15	0	4	0	0
Good middling and Second	3	5	0	3	10	0
Common middling	3	0	0	3	5	0
Undersized	3	0	0	3	5	0
Swedish and Norwegian Balks	2	10	0	2	15	0
Baltic Oak Timber—						
Danzig and Stettin—Large	3	5	0	4	5	0
Small	2	10	0	3	5	0
Quebec Timber per load						
Yellow Pine	4	15	0	6	5	0
Oak	4	12	6	6	15	0
Elm	4	2	6	4	7	6
Ash	3	7	6	4	2	6
Birch	3	7	6	5	15	0
New Brunswick, &c., Birch	3	2	6	3	12	6
American Pitch Pine Timber	3	17	6	4	10	0
Wainscot, per log, 18 cubic ft.—						
Crown (Eng. & Dutch) } nominal {	3	7	6	4	10	0
Brack } nominal {	2	12	6	3	12	6
Lathwood, per cubic fathom—						
Petersburg	4	0	0	6	10	0
Riga and Danzig	4	10	0	5	10	0
Norway Poles, per ft. run	0	0	1	0	0	1½
Oak Staves, per mille full size pipe						
Memel, Crown	220	0	0	230	0	0
Brack	190	0	0	200	0	0
Danzig	165	0	0	175	0	0
Bosnia, single Barrel (nominal)	28	0	0	30	0	0
United States, Pipe	37	10	0	45	0	0
Hogshead, extra heavy and double extra	30	0	0	35	0	0
Indian Teake per load	11	10	0	17	0	0
British Guiana Greenheart	0	0	0	8	0	0
Mahogany, per foot superficial—						
Honduras, cargo average	0	0	5	0	0	6½
Nicaragua, do.	0	0	4½	0	0	5½
Tabasco, do.	0	0	4½	0	0	6½
Mexican, do.	0	0	4	0	0	4½
Panama, do.	0	0	3	0	0	4
African, do.	0	0	3½	0	0	5½
Cuba, do.	0	0	6	0	0	8
St. Domingo, do.	0	0	5	0	0	7½
Do. Curls (good to prime)	0	0	9	0	1	3
Walnut, American (logs)	0	2	3	0	4	6
Do. do. (planks and boards)	0	2	0	0	7	6
Italian, per foot superficial	0	0	3	0	0	7½
Black Sea, per ton	6	0	0	12	0	0

* The prices named are for the wood as imported and landed in the docks. Ten per cent., approximately, should be added in order to arrive at the current trade prices.

PRICES CURRENT—*continued.*

	£	s.	d.	£	s.	d.
Satin Walnut (logs) per foot cube	0	1	0	0	1	3
" (planks and boards)	0	2	0	0	2	9
Sequoia (Californian redwood), per foot cube	0	1	9	0	2	0
Whitewood, American (logs)	0	1	3	0	1	6
" " (planks and boards)	0	1	6	0	2	9
Quartered oak " "	0	2	3	0	4	0
Kauri pine (logs)	0	1	9	0	2	0
" " (planks)	0	2	3	0	2	9
Jarrah (planks)	0	2	0	0	2	3
Lancewood spars each, fresh and large	0	5	0	0	8	0
Lancewood spars, ordinary to fair	0	4	0	0	5	0
Degame spars	0	8	0	0	10	0

METALS.

IRON—Pig, in Scotland ton	3	8	7	0	0	0
Bar, Welsh, in London	9	0	0	9	15	0
Do. do. at works in Wales	8	10	0	9	0	0
Do. Staffordshire, in London	9	15	0	11	15	0
COPPER—British cake and ingot	78	0	0	73	10	0
Best selected	79	0	0	80	0	0
Sheets, strong	83	0	0	84	0	0
Chili bars	75	0	0	0	0	0
YELLOW METAL lb.	6¾d.			7d.		
LEAD—Pig						
Spanish ton	17	15	0	0	0	0
English Com. Brands	18	0	0	0	0	0
Sheet, English, 6 lbs. per sq. ft. and upwards	19	5	0	0	0	0
Pipe	19	15	0	0	0	0
ZINC—English sheet ton	26	0	0	0	0	0
Vieille Montagne	27	0	0	0	0	0
Spelter	20	0	0	20	2	6
TIN—Straits	125	0	0	0	0	0
Australian	125	5	0	125	10	0
English Ingots	129	0	0	130	0	0
Banca	0	0	0	0	0	0
Billiton	0	0	0	0	0	0

OILS.

Linseed ton	21	5	0	0	0	0
Cocoanut, Cochin	29	15	0	0	0	0
Do. Ceylon	26	15	0	0	0	0
Palm, Lagos	27	10	0	0	0	0
Rapeseed, English, pale	24	10	0	0	0	0
Do. Brown	23	0	0	0	0	0
Cottonseed ref.	19	10	0	20	0	0
Oleine	17	5	0	19	5	0
Lubricating U.S.	0	8	0	0	0	0
Do. Black	0	7	6	0	0	0
TAR—Stockholm barrel	1	6	6	0	0	0
Archangel	1	0	0	0	0	0
Turpentine	36	17	6	37	0	0

RECENT PATENTS:

ACCEPTED SPECIFICATIONS.

Open to Opposition until January 29.

[1898] 18,158, Preble, Lathes for Turning Wood and Other Materials. 24,501, Ellen, [1899] 17,406, Matthews, 20,354, Llorens, and 21,035, Kellner, Acetylene Gas Generators. 24,926, Weber, Hinges. 25,081, Van Kannel, Revolving Doors. 25,241, Downie, Winches. 25,275, Carré, Fireproof Paint or Composition. 25,304, Rudolph Koepp & Co., Artificial Stone. 25,305, Stanning & Aldcroft, Coating of Moulds for Casting Metals. 25,730, Kossov, Wisehew, & Soffronow, Safety Locks. 25,943, Webb, Protecting and Packing Glazed and Other Bricks, Tiles, &c. 26,194, Herbert, Moulding Spigot and Socket Pipes, Flange Pipes, &c. 26,526, Clark, Crucible for Casting Lead or Similar Metals under Pressure, especially in Respect of Secondary Electrical Battery Grids or Plates. 27,156, Leslie, Smoke-consuming and Heat-economising Apparatus. 27,205, Duncan, Incandescent Burners and Mantle Supports. 27,228, Geipel & Lange, Regulators for Hot-water Heating Apparatus. 27,327, Bate, Oakes, & Thom, Artificial Stone for Lithographical and Other Purposes. 27,580, Stewart, Locking Device for the Doors of Ashpits and other receptacles. 27,636, Arter, [1899] 2,074, Eschwei, and 15,210, Chagnaud, Electrical Arc Lamps. [1899] 2, Highfield, Electrical Main Connexions. 345, Simpson & Others, Fireproof Compositions for Painting or Covering Wooden and Other Surfaces. 356, Gans, Incandescent Materials and Lamps Suitable for Electrical Lighting. 458, Mendel, Door Bolts. 555, Delattre, Purification of Waste and Impure Waters. 1,205, Waller, Cold Water Storage Tanks. 1,260, Hislop, Single or Double Outlet Stand Pipes for Hydrants. 1,370, Whale, Oil Stoves. 1,455, Craddock, Domestic Flexible Fire-guard. 1,496, Whitehouse & Billings, Oil-stone or Hone-case or Box. 1,571, Wright & Woodroffe, Hanging Lamps. 1,640, Hougham, Ranges for Cooking and Heating. 1,825, Ernst, Gauges for Cylindrical Surfaces and Screw Threads. 1,830, Fischer, Windows. 1,925, Forrest, Device for Facilitating the Teaching of Drawing, Sketching, &c. 1,941, Hirst & Murphy, Electrical Incandescent Lamp Pendants or Brackets. 2,185, Von Pittler, Slide-rests or Bed-slides of Lathes, &c. 2,766, Welsby & Ward, Guards and Riving-knives for Use with Circular Saws. 2,921, Neill, Bricks, &c. 2,938, Ward, Kilns and Ovens for Drying Stone and Similar Material. 3,153, Ireland, Automatically Lighting Fires, Candles, Jets, &c., at Definite Times. 3,663, Biebuyck, Closets. 5,221, Dolan, Acetylene Lamps. 6,133, Dewdney, Rail Supports. 7,139, Morgan, Door, Gate, Casement, and Similar Closing Apparatus. 9,276, Jolles, Filters and Filtering Materials. 12,951, Vereinigte Elektricitäts A. G., Cut-out Apparatus for Automatically Disconnecting Incandescent Lamps having Filaments of Secondary Conductivity. 13,506, Cars, Lamp Extinguishers. 14,266, Mennell, Mennell, & Walls, Guard for Circular Saws, &c. 16,999, Woolley, Magneto-electrical Telegraphs. 17,707 and 20,720, Allgemeine Elektricitäts G., Electrical Incandescent Lamps, and Electrical Lamps having Illuminating Bodies Composed of Second-class Conductors. 18,417, Hornish & Clark, Boiler Cleaners. 18,711, Shaw, Smoke Bells, &c., of Glass, Porcelain, or other Vitreous Materials. 18,875, Gennert, Glass-grinding Machines. 19,615, Ninnemann, Water and Similar Taps. 19,659, Boyd, Air-pump for Testing the Soundness of Chimneys, Drains, and other Spaces. 19,700, Healey, Sewer or Drain-pipe Cleanser. 19,846, Thomas, Conduit Terminal and Junction Box for Electrical Wires. 20,068, Beer, Ohm-meter for Directly Indicating Resistances. 20,481, Staercke, Chains. 20,917, Koringer & Lagus, Means for

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
*Erection of Hospital	Doncaster R.D.C.	25*l.* and 15*l.*	Feb. 28
*Erection of General Hospital	Glasgow Parish Council	200*l.*; 150*l.*; 100*l.* and 50*l.*	No date

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
Pipe Sewers, Victoria-road	Aberdeen T.C.	W. Dyack, Burgh Surv. Town House	Dec. 12
Sanitary Pipes, &c.	Bedlingtonshire U.D.C	C. D. Forster, 24, Grainger-street West, Newcastle-on-Tyne	do.
Additions to Munsborough House, Great Yarmouth	E. Bond	C. G. Baker, Archt. Great Yarmouth	do.
House, Spaines-road, Fartown, Yorks.	———	J. Berry, Archt. 9, Queen-st. Huddersfield	Dec. 13
Block of Shops, Heckmondwike	———	Castle & Son, Archt. Market-st. Heckmondwike	do.
House, Delghton-lane, Batley	———	C. H. Marriott & Son, Archt. Dewsbury	do.
Sewerage Works, Coulsdon and Sanderstead	Croydon R.D.C.	R. M. Chart, Surv. Union Bank Chmbrs. Croydon	do.
Offices, High-street, Hull	———	B. S. Jacobs, Bowlalley-lane, Hull	do.
Stables, &c. Wolsey-street	Ipswich Corp.	E. Buckham, Boro Surv. Town Hall	do.
Drainage Works, Crondall, Hants.	———	H. Guyer, Archt. South-st. Farnham	do.
Underground Convenience, Elmgrove	Brighton Corp.	F. J. C. May, Town Hall, Brighton	Dec. 14
Clock Tower, Thornton Heath	Croydon T.C.	Boro Engr. Town Hall	do.
Hotel, Southerndown, Glam.	W. Powell	G. F. Lambert, Archt. Bridgend	do.
Eight Shops, Donegall-square West, Belfast	Scottish Provident Institution	Young & Mackenzie, Archt Belfast	do.
Technical College, Wigan	———	Briggs & Wolstenholme, Richmond-terrace, Blackburn	do.
New Roads, &c. Newtown, nr. Didcot	Wallingford R.D.C.	G. F. Slade, Council Offices, Wallingford	do.
*Stores and Materials	City of Nottingham	A. Brown, City Engr. Guildhall	do.
*Foundations and Works, Victoria and Albert Museum	H.M. Office of Works	H. M. Office of Works, Storey's Gate, S.W.	Dec. 15
*Foundations and Works, Royal College of Science	do.	do.	do.
Cast Iron Water Mains and Laying	Langport (Somerset) R.D.C.	Bailey, Denton, & Co Engr. 9, Bridge-st. S.W.	do.
Police Station, Bredbury, near Stockport	———	G. Beswick, Archt. Newgate-st. Chester	do.
Electrical Plant	Blackpool Corp.	R.C. Quin, Engr. Electricity Works, Blackpool	do
Additions to Congregational Church, Abergavenny	Building Committee	B. J. Francis, Archt. Abergavenny	do.
House, Aberlour, N.B.	———	C. C. Doig, Archt. Elgin	do.
Hospital	Jut. Hospital Bd.	J. G. T. West, Archt. Abingdon	Dec. 16
Business Premises, 61, High-street Bridlington	J. Wilcock	S. Dyer, Archt. Bridlington	do.
Steel Tie Bars, &c.	Manchester Corp.	J. M. M'Elroy, Town Hall	do.
House and Offices, Tooreen, co. Galway	C. O'Hara Trench	J. Smith, C.E. Ballinasloe	do
Police Station and Court House, Howden, Yorks.	Standing Joint Comte. I. of Thanet Jt. Hospt Bd.	A. Beaumont, C.E. County Hall, Beverley	Dec. 17
*Erection of Hospital	———	Langham & Osborne, 70, High-st. Ramsgate	Dec. 18
Street Works, Troedyrhiw	Pontyrhun Building Club	G. P. Davies, Archt. Queen's Chambers, Neath	do.
Sewer, Lenton-boulevard	Nottingham Corp.	A. Brown, C.E Guildhall, Nottingham	do.
*Erection of Laundry	Romford Board of Guardians	R. L. Curtis, 119, London Wall	do.
*Erection of Hospital Building	E. Ashford R.D.C.	11, Bank-st. Ashford	do.
*Construction of Underground Transformer Stations	Boro. of Shoreditch	J. Rush Dixon, Town Hall, Old-st. E.C.	Dec. 19
Station, Blaen Lynir, Glam.	G. W. Ry. Co.	G. K. Mills, Paddington Station, W.	do.
Stables, Frome Station	do.	do.	do.
Kerbing, &c. West End, nr. Southampton	South Stoneham R.D.C	J. Cudlipp, Surv. Old Netley, Hound, nr. Southampton	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered
C.I. Pipes (6,000 yards)	Hamilton, N.B	———	
Stoneware Pipes, &c.	King's Lynn Corp.	Leslie & Reid, C.E. 72A, George-st. Edinburgh	Dec. 19
Waterworks	Brightlingsea (Essex) U.D.C.	H. J. Weaver, Boro. Engr. King's Lynn	do.
Pipe Sewer, Church-st.	Cromer U.D.C.	W. I. Osborn, Foresters' Hall, Brightlingsea	Dec. 20
*Additions to Vestry Hall	Chiswick U.D.C.	A. F. Scott, Surv. Church-st. Cromer	do.
*Street Improvement Works	do.	A. Ramsden, Vestry Hall, Chiswick	do.
*Making-up and Paving Holyport-rd. and Edgarley-terrace	Fulham Vestry	do.	do.
*Alterations to the East Gangway at Cromer	Cromer U.D.C.	C. Botterill, Town Hall, Fulham	do.
*Laying Pipe Sewer	do.	A. F. Scott, Church-st Cromer	do.
*Sewerage Works	do.	do.	do.
*Alterations to No. 9, Parson's green	Parish of Fulham	do.	do.
*Levelling, Paving, &c. New Portland-rd.	Borough of Kingston-on-Thames	A. S. Snell, 22, Southampton-bldgs. Chancery-lane	Dec. 21
*Supply of Flints and other Stone	do.	Boro. Surv. Clattern House Kingston-on-Thames	do.
Jarrah Timber	Lambeth Vestry	do.	do.
*Carrying-out New Drainage, &c.	———	H. Edwards, C.E. Vestry Hall, Kennington Green, S.E.	do.
*Erection of House	Gainsborough U.D.C.	W. Buck, North-street, Horsham	do.
Electrical Equipment	Blackburn Corp.	P. Griffith, 54, Parliament st. Westminster	Dec. 23
Additions to Workhouse	Cardiff Union	Lacey & Co. 2, Queen Anne's Gate, S.W.	do.
Electrical Plant	Gloucester Corp.	E. Seward, Archt. Queen's Chambers, Cardiff	do.
*Machinery and Alterations to Laundry	Boro. of Richmond	E. Hammond, C.E. 64, Victoria-st. S.W.	Dec. 28
*Construction of Reservoir	Llanelly U.D.C.	F. C. Greville-Smith, 172, High-st. Hounslow	Dec. 29
Hospital, Clydebyll	Pontardawe Hospital Com.	J. H. Barnes, 30, G. George-st. Westminster	Jan. 2
*Erection of Public Library	Vestry of St. John, Hampstead	J. Morgan, Surv. Herbert Chambers, Pontardawe	Jan. 3
Offices, Fire Station, &c. Whitley (Northumberland)	Whitley & Monkseaton U.D.C.	The Clerk, Vestry Hall, Haverstock Hill, N.W.	Jan. 4
Alterations, &c. Bishop Blaize Hotel, Rawtenstall	———	J. P. Spencer, 13, Grainger-st. West, Newcastle	Jan. 5
Buildings, &c. Walkley-lane, Sheffield	G. A. Milne	John Baxter, Ltd. Glen Top, Waterfoot	No date
Laying Sewers (1 mile), Lowestoft	———	H. Webster, Archt. St. Mary's Chambers, Norfolk-row, Sheffield	do.
Presbyterian Church, Whalley Range, Blackburn	———	W. J. Roberts, Archt. Lowestoft	do.
New Roads, off Springvale-rd. Sheffield	———	F. W. Dixon, Archt. Trevelyan-bldgs. Manchester	do.
Additions, Commercial Hotel, Gisburne	J. Green	Hall & Fenton, Archt. 14, St. James-row, Sheffield	do.
Girders and Fireproof Floors	Chesterfield Sch. Bd.	T. Bell, Archt. 14, Grimshaw-st Burnley	do.
School, Ashley-st.	Carlisle Sch. Bd.	Tiltman & Jackson, Archt 29, Knifesmith-gate, Chesterfield	do.
		T. T. Scott, Archt. 43, Lowther-st. Carlisle	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in.
*Surveyor	City of Canterbury	300*l.* per annum	Dec. 13
Clerk of Works	Croydon R.D.C	4*l.* per week	do.
*Quantity Surveyor	Middlesbrough Sch. Bd.	———	do.
Surveyor, &c.	Buckfastleigh (Devon) U.D.C.	Not stated	Dec. 14
*Engineer and Surveyor	Cnty. Boro. of Halifax	500*l.* per annum	Dec. 18
*Junior Clerk and Jobbing Mason	Hendon U.D.C.	———	do.
*General Foreman	Parish of St. Mary, Battersea	5*l.* per week	Dec. 20
*Clerk of Works	Chesterfield Sch. Bd.	3*l.* per week	Dec. 21
*Clerk of Works	Wolverhampton Union	350*l.* per annum	Dec. 27
*Building Inspector	Walthamstow U.D.C.	2*l.* 15*s.* per week	Dec. 29
*Assistant Engineer	City of Liverpool	300*l.* per annum	Dec. 30

Those marked with an asterisk (*) are advertised in this Number. *Competitions, p.* iv *Contracts, pp.* iv. vi. viii. x. & xxi. *Public Appointments, pp.* xix. & xxi.

Raising and Lowering Windows, &c. 20,983, Wood, Trolleys Used on Overhead Wires for Electrical Traction. 21,117, Schalk, Kitchen Ranges, &c. 21,160, Krausse, Refrigerating Apparatus. 21,220, Gibbs, Composition for Filling the Pores of Wood before it is Polished. 21,256, Glaser, Fire Escapes. 21,261, Ryan, Pipe Wrenches.

ABSTRACTS OF PATENTED INVENTIONS.

17,079.—ACETYLENE GENERATOR: *F. Gehlert.*—The inventor's object is to avoid the smell of the by-products and gas; the cover of the generator, which is hermetically sealed by wing-nuts, a bridge, and a screw, carries a manometer and a gas-delivery pipe joined to a wall bracket by means of a ball-joint on which the cover can be turned back. The carbide is supplied by means of spring tongs, supporting a pin that carries the container, which are closed by being drawn into a sleeve suspended within the cover; when the generator has been charged with water and the gas-cock has been opened, the spring tongs are released from the sleeve (by turning a screw) and thereby the container falls into the water, the gas-cock is closed when the carbide is exhausted, taps are opened that the by-products may be washed out, and upon removal of the cover a fresh charge of carbide is fastened between the tongs.

17,089.—LIGHTING LAMPS, &C., WITH ELECTRICITY: *F. Krieger.*—In order that the flame may not injure the incandescing ignition-wire, the wire is mounted upon insulated sliding-pieces, which a push-piece lifts to the burner's edge, a projection striking a contact-pin to complete the circuit. The parts return to their normal positions by means of a spring when the push-piece is freed.

17,123.—VENTILATING AND CLEANSING WORKSHOPS, &C.: *A. W. Metcalfe & J. B. Morrison.*—The dust is removed by exhaust pipes whose ends are closed by caps for which a hose may be substituted, and the hose's free end is turned about by hand to collect the dust in the room as well as in a holder in the gill box. Other pipes convey fresh or moistened air, or steam to the apparatus.

17,129.—SIPHONICAL DISCHARGE: *F., J. J., & W. R. Rawlings.*—For an intermittent and automatical discharge a float, sliding upon the siphon's short arm, is joined with rods to a cup which when the water rises fits over the inlet and prevents the siphon from acting before the flush is started by the sinking of the float when filled with water; an auxiliary siphon then empties the float again; a rope passing over pulleys may serve to join the float and cup, and the latter may be formed with a ringed channel to fit over the siphon's end, or so as to rest upon catches upon the float-arms.

17,134.—PLASTER SLABS OR BOARDS FOR WALLS, CEILINGS, &C.: *B. F. Schwartz.*—Slotted or open-work slabs of plaster are formed, laid upon a woven wire core; they may be rigid, or divided between the slots to admit of the slab being rolled up or being applied to a curved surface. Projecting and overlapping wire selvages fasten the slabs to the surface, and grooves in the back of the slab between the slots take plaster keys, the plaster being laid upon the slab's outer surface and pressed through the slots and between the edges to form the keys.

17,141.—MOSAICS AND CLOISONNÉ WORK: *T. Pfister.*—A brush dipped into some adhesive material is used for marking the design in outline upon the backing, and particles of mineral or glass are sprinkled over the gum or similar material in order to form the rib divisions, or a stencil plate may be employed for laying-on the gelatine or gum. By another method, the ribs or strips are formed of gilt, crystal, or coloured beads threaded upon strings or wires dipped into varnish, wax, or glaze, so that they may retain their shapes when bent, and for narrow strips the beads are wedged or taper-shaped.

17,153.—TREADS FOR STAIRS, FLOORS, &C.: *W. H. Bysouth.*—Lower dove-tailed or similar grooves are cut in wooden blocks which are inserted between dove-tailed rails affixed to the stair-treads or to angle-iron brackets fastened into the risers or embedded in steps made of stone or of composition; nosing-bars, to hold the blocks in their places, are fixed by screws on to the dove-tailed key-rails, and leaden or other strips can be put into grooves formed on the upper surfaces of the blocks, which, when worn, can be easily renewed by taking away the nosing-bars.

17,158.—ARTIFICIAL STONE: *W. Courtenay.*—By way of an improvement upon the process specified in No. 7,184 of 1891, an inner body of calcined and pulverised granite, fireclay, and ground felspar, made plastic by mixing with water, is moulded in the building-block or slab, and is faced with a similar composition containing a larger part felspar, which fuses and produces a vitrified surface where the blocks are burned in a kiln or fired in saggers; for protection of the surface when in the kiln it should be sprayed with a pottery glazing-mixture to be afterwards removed by either hydrofluoric acid or use of the sand blast.

17,193.—ELECTRICAL CONDUCTORS: *E. Passburg.*—Insulated conductors, in the form of induction coils, bobbins for armatures, coils, &c., are dried in an apparatus which is heated by means of electricity or steam pipes, the conductors being laid upon trays mounted on runners; a pump is used to exhaust the container and the evaporated moisture is condensed, provision being made to draw away the extracted moisture through a cock, and, after re-exhaustion, to collect all remaining moisture in a graduated tube.

17,239.—AFFIXING WOOD WORKS TO WALLS: *W. E. Barnes.*—Dove-tailed recesses are cut in building blocks or bricks for the insertion therein of wooden plugs to which dados, skirtings, and wall linings may be fastened with nails or screws. The plug may be long enough to pass, either horizontally or vertically, through more bricks than one.

17,250.—WINDOW SASHES: *C. C. & M. H. Mallett.*—Side arms or links are arranged to turn upon fixed pivots and to carry a reversible sash mounted upon horizontal pivots. A crank extension of each link presses against the frame's side, and so limits the turning upon the pivots, which are placed nearer to the top rail than to the bottom rail of the sash in order that the sash's own weight may operate to turn it into position, whilst the turning of the sash upon the pivots is controlled by the bearing against the links of lateral projections upon the pivot plates, which are fastened on to the stiles. Thus the sash turns about two parallel horizontal axes.

17,316.—WATER WASTE PREVENTERS: *J. Challender.*—The flap valve of a valve chamber, placed within the discharge pipe, presses upon a seating and is also attached to an axle operated by the two ends of a U-shaped arm for raising the valve; the flush beats against and lowers a fan-shaped arm, which locks the valve when raised, and noise is prevented by means of a float which closes the discharge pipe when the cistern is almost empty.

17,360.—WALL PAPERS: *G. W. Osborn.*—In order that wall papers may be hung without trimming their edges, the pattern is printed to the edge of the paper along one side and is extended at the two corners of the other side, so as to repeat the pattern on the former side; a blank strip may remain upon the side of the surplus strip, to be covered by the overlapping edge. The papers are roller-printed.

17,365.—FOR FACILITATING THE REPAIR OF VALVES AND COCKS: *J. G. Walliker.*—The contrivance consists of a ball or other valve, which becomes closed by fluid pressure during a repair of the main valve, but is normally sustained above its seating by a projecting piece upon a lift-valve or plug-cock casing; the extension, or projecting piece, has holes cut in it, and the valve box can be formed in two parts, with guides and a screw-thread, for use with a steam generator, &c.

17,371.—ELECTRICAL BELLS: *Markt Bros. & Co.*—The apparatus combines an electrical bell and a battery, the latter being contained within a casing, which is screwed at either end to engage a base and a cover; metal plates joined to the bell mechanism, and bearing against spring contacts on the battery, are carried by the cover and attached to the conductor. For use as a table bell, the conductor is wound round about the casing (scored to represent loop-holes in the castellated cover), and the push supported by a hook.

17,383. — BUNGALOWS AND SIMILAR STRUCTURES: *F. J. Kellow.*—Uprights are driven into the soil, or embedded in concrete within boxes, and between them are laid plates either formed with or attached to troughs which have slots so that they may slide on ribs of the uprights and are recessed to engage with the upper edges of the plates in succession. Above the uprights are fitted other plates which have sockets for taking the rafters. For the roof may be used shingles, slates, or tiles, or it may be covered with boards or galvanised iron coated with clay, &c. The wall-plates are plastered on both sides with mortar and clay, an outer coat of cement being added.

17,398.—SIPHONICAL DISCHARGE: *C. H. Woodhouse, J. W. Cook, & D. W. Cook.*—To the bottom of the cistern, and dipping into a well, is fastened a flanged pipe in which the siphon is socketted; the fall of a dome-shaped plunger, placed inside a cylinder starts the flush, and in the sides of the well are vertical slots into which slips a plate on which the inlet valve is fitted.

Erratum. — In this column, page 499 *ante*, "No. 16,546" should be "No. 16,454."

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

November 21.—By NEASON & WHITE (at Redditch).

Feckenham, Worcester.—Astwood Farm, 80 a. 0 r. 39 p., f. £2,000

November 22.—By R. & A. G. THOROWGOOD (at Hoddesdon).

Hoddesdon, Herts.—Amwell-st., Rowley Field, with three cottages, f. 1,450

November 24.—By A. J. SHEFFIELD.

Upton Park.—3 to 13 (odd), Rutland-rd., u.t. 96 yrs., g.r. 30*l.* 1,270

1, Selsdon-rd., f. 350

Stratford.—53, Steele-rd., and 2 plots of land adjoining, f. 390

November 25.—By MACQUIRE & MERRY (at Northampton).

Grendon, Northants.—The Grendon Hall Estate, 332 a. 0 r. 16 p., f. (in lots) 12,790

By R. & A. G. THOROWGOOD (at Hertford).

Ware, Herts.—Babb's Green, Appleton's Farm, 38 a. 0 r. 37 p., f. and c. 2,000

November 27.—By ELLIOTT, SON, & BOYTON.

West Hampstead.—28, Acol-rd., f., e.r. 150*l.* 2,850

By FURBER, PRICE, & FURBER.

Lambeth.—4, Royal-st., u.t. 24½ yrs., g.r. 2*l.* 220

23, Royal-st., u.t. 24½ yrs., g.r. 2*l.* 200

Forest Hill.—9, London-rd., u.t. 33 yrs., g.r. 8*l.*, r. 42*l.* 305

By ROBINS & HINE.

Brompton.—46, Walton-st., u.t. 29½ yrs., g.r. 6*l.*, r. 90*l.* 1,145

Belgravia.—9, West Halkin-st., u.t. 29 yrs., g.r. 10*l.*, r. 300*l.* 4,200

November 28.—By FORTESCUE & BRANSON.

Barnsbury.—62, Westbourne-rd., u.t. 60 yrs., g.r. 7*l.*, r. 42*l.* 485

Islington.—109, Cloudesley-rd., u.t. 24 yrs., g.r. 5*l.* 5s., r. 34*l.* 235

By J. H. HIBBARD.

Chelsea.—5, Walton-st., u.t. 42½ yrs., g.r. nil, r. 60*l.* 725

50, Rawlings-st., u.t. 43¼ yrs., g.r. nil, r. 60*l.* .. 760

West Ham.—56, Reginald-rd., f., r. 26*l.* 325

Stoke Newington.—4, Park-lane, u.t. 60 yrs., g.r. 9*l.*, r. 45*l.* ..... 44?

Tottenham.—31, Henry's-road, u.t. 68 yrs., g.r. 3*l.* 3s. 145

Southend, Essex.—Oak Villa, Hartington-rd., f., r. 28*l.* 12s. £395

By ALFRED RICHARDS.

Tottenham.—High-rd., a freehold building estate, area 10 a. 2 r. 24 p. 8,000

Walthamstow.—Byron-rd., The Greenleaf, f. 315

37, Grosvenor Pk.-rd., f.; also 39, Grosvenor Pk.-rd., u.t. 12½ yrs., g.r. 26*l.* 10s. 500

By SUDLOW, HERRICK, & SONS.

Brixton.—73 and 75, Loughborough-rd., u.t. 23 yrs., g.r. 9*l.*, r. 35*l.* 500

22, Holland-rd., u.t. 23 yrs., g.r. 5*l.* 10s. r. 36*l.* 190

34 and 36, Claribel-rd., u.t. 15 yrs., g.r. 10*l.* 18s., r. 70*l.* 330

By F. WARMAN.

Finsbury Pk.—107, Finsbury Pk-rd., u.t. 68 yrs., g.r. 9*l.* 7s., e.r. 48*l.* 520

By W. N. WILLOUGHBY.

Norwood.—31, 35, and 37, Selsdon-rd., u.t. 93 yrs., g.r. 18*l.*, r. 104*l.* 970

By NOTT & CARTWRIGHT.

Battersea.—140, 142, and 144, High-st., u.t. 42 yrs., g.r. 30*l.*, r. 197*l.* 12s. 1,250

Westminster.—65, Ponsonby-pl., u.t. 25¾ yrs., g.r. 5*l.* 5s. 460

Pimlico.—25, Denbigh-st., u.t. 38 yrs., g.r. 8*l.*, r. 55*l.* 570

By BOYTON, PEGRAM, & BUCKMASTER (at Walham-green).

Fulham.—3, Goodson-rd., f. 390

2 and 4, Goodson-rd., u.t. 71 yrs., g.r. 9*l.* 430

35, 37, and 39, Jervis-rd., u.t. 71 yrs., g.r. 16*l.* 10s. 690

32, 36, 38, and 42, Bishop's-rd., u.t. 82 yrs., g.r. 28*l.* 1,175

74, 76, and 114, Bishop's-rd., u.t. 77 yrs., g.r. 18*l.* 900

51, Waldemar-av., u.t. 86 yrs., g.r. 6*l.* 10s. 340

Putney.—5, 7, 11, to 17 (odd), Mexfield-rd., u.t. 94 yrs., g.r. 37*l.* 16s. 1,820

November 29.—By ARTHUR BLACKFORD.

Fulham.—St. Thomas-rd., f.g.r.'s 17*l.* 3s., reversions in 59 and 63 yrs. 453

Estcourt-rd., f.g.r. 10*l.* 12s. 6d., reversion in 60 yrs. 272

Estcourt-rd., f.g.r.'s 18*l.*, reversion in 55 yrs. .. 720

Estcourt-rd., &c., "The Redan" p.-h., &c., f.g.r.'s 7*l.*, reversions varying from 54 to 64 yrs. 378

Stratford.—97, Gurney-rd., u.t. 65 yrs., g.r. 4*l.*, e.r. 30*l.* 235

By C. RAWLEY CROSS & CO.

Shepherd's Bush.—9, Thornfield-rd., f., r. 36*l.* 550

150, Shepherd's Bush-rd., u.t. 77 yrs., g.r. 12*l.*, r. 70*l.* 770

233, Uxbridge-rd., u.t. 66 yrs., g.r. 10*l.*, e.r. 50*l.* 385

By I. FARLOW.

Norwood.—148, Gipsy Hill, u.t. 67 yrs., g.r. 7*l.* 7s., e.r. 32*l.* 200

Streatham.—87, Hambro-rd., u.t. 95 yrs., g.r. 5*l.* 10s., e.r. 40*l.* 360

35, 36, 37, 44, and 45, Leonard-rd., u.t. 96 yrs., g.r. 21*l.* 755

By ROBINS, GORE, & MERCER.

Edgware-rd.—7, 8, and 9, Little Church-st., u.t. 22 yrs., g.r. 22*l.* 15s. 300

Holloway.—Annesley-rd., Manor Cottage, u.t. 78 yrs., g.r. 4*l.* 17s. 6d. 140

Paddington.—277, Harrow-rd., u.t. 21 yrs., g.r. 80*l.* for first 10 yrs., and 85*l.* for rest of term .. 410

Bloomsbury.—4, Dunstaple-court, u.t. 10 yrs., g.r. 25*l.* 100

By R. TIDEY & SON.

Wood Green.—577, Green-lanes, f., r. 100*l.* 1,600

De Beauvoir Town.—46, 48, and 50, Buckingham-rd., u.t. 21 yrs., g.r. 9*l.* 15s., r. 96*l.* 575

Dalston.—18, Navarino-rd., u.t. 53 yrs., g.r. 6*l.*, e.r. 50*l.* 540

By A. DOWELL (at Edinburgh).

Larbert, Stirlingshire.—The Estate of Glenbervie, 827 a. 27,000

By WILLIAM WESTON (at Paddington).

Paddington.—2, Blomfield-mews, u.t. 43 yrs., g.r. 8*l.*, r. 28*l.* 250

9, 10, and 11, Jonson's-mews, u.t. 50 yrs., g.r. 12*l.* 600

22, Delamere-cres., u.t. 51 yrs., g.r. 8*l.*, r. 55*l.* .. 445

Willesden.—30 and 32, Roundwood-rd., u.t. 98 yrs., g.r. 14*l.* 660

November 30.—By C. C. & T. MOORE.

Commercial-rd. East.—Nos. 252 and 254, f., r. 120*l.* 2,900

Whitechapel.—2, Colchester-st., u.t. 16 yrs., g.r. 30*l.*, r. 174*l.* 1,000

Kentish Town.—Prince of Wales-rd., f.g.r. 7*l.*, reversion in 51½ yrs. 210

By ST. QUINTIN & SON.

Brompton.—98 and 100, Brompton-rd., area 5,460 ft., f., r. 180*l.* 9,000

By DAVID J. CHATTELL.

Wimbledon.—Alexandra-rd., f.g.r.'s 156*l.*, reversion in 90 yrs. 4,390

Chislehurst, Kent.—4, 5, 6, and 7, Lower Camden, u.t. 61 yrs., g.r. 60*l.*, r. 270*l.* 2,100

Hounslow.—Lampton-rd., f.g.r.'s 180*l.*, reversion in 75 yrs. (in lots) 4,540

By GREEN & SON (Hammersmith).

Barnes.—149, Castelnau, u.t. 40 yrs., g.r. 8*l.*, e.r. 55*l.* 495

Gunnersbury.—52, Oxford-rd., u.t. 67 yrs., g.r. 9*l.* 10s., e.r. 65*l.* £505

By GEORGE HEAD & CO.

Islington.—31, Devonshire-st., f., r. 46*l.* 805

Marylebone.—13, Huntsworth-mews, u.t. 21 yrs., g.r. 14*l.* 14s., r. 60*l.* 265

By JONES, LANG, & CO.

Fenchurch-st.—Lloyd's-av., building leases for 80 yrs. of five sites, area 16,990 ft., at per annum 3,310

By RAMSAY, WAINWRIGHT, & CO.

Crouch End.—Grove House-rd., "Arkley Cottage," area 5,120 ft., f., e.r. 40*l.* 650

By J. A. & W. THARP.

Stamford Hill.—St. Anne's-rd., f.g.r. 10*l.*, reversion in 75 yrs. 290

Aldgate.—21, Houndsditch, and 36, Duke-st., u.t. 66½ yrs., g.r. 118*l.* 15s. 5d., r. 340*l.* 2,200

Stoke Newington.—46, 47, 52, and 53, Newington-green, f., r. 220*l.* 4,250

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*** Denotes *accepted.* † Denotes *provisionally accepted.***

CHELSFIELD (Kent).—For additions, alterations, and new sanitary arrangements at the Board Schools, Chelsfield, Kent. Mr. St. Pierre Harris, architect. Quantities by Messrs. Stanger & Son:—

Stebbings & Pannett	£2,042	W. Owen	£1,794
T. Knight	2,010	Somerford & Son	1,759
T. D. Graty	1,990	J. Smith, Chelsfield†	1,751
R. A. Lowe	1,949		

HENDON.—For fully making up the following private roads, sewerage of Golder's Hill, and the construction of certain flushing chambers, for the Urban District Council of Hendon. Mr. S. Slater Grimley, Engineer and Surveyor:—

	Lichfield-road.	Oak-grove.	Ravenstone-road.	Golder's Hill Sewerage.	Flushing Chambers.
E. & F. Jackson	£1,174 18 9	£1,462 16 9	£876 8 10	£427 16 8	£333 3 0
W. Griffith	1,144 14 0	1,189 6 11	875 16 6	378 17 8	343 16 0
C. W. Killingback & Co., James-street, Camden Town	1,223 8 6	1,160 14 5	887 9 8	352 0 0	252 2 3*
Thos. Adams	1,067 2 8	1,054 1 0	784 13 8	421 12 0	353 17 0
Thos. Free & Son	1,044 14 8	986 6 10	882 11 4	428 13 10	257 6 6
Cliff Ford	1,040 16 3	1,054 15 5	759 10 2	384 12 8	283 11 6
E. W. Hollingsworth, Bell-lane, Hendon, N.W.	984 9 11	1,620 14 8	768 7 7	323 19 0*	267 4 6
R. Ballard, Limited, Child's Hill-road, N.W.	974 15 5*	957 5 7*	752 9 6*	352 10 6	266 12 6
Grounds & Newton (withdrawn)	853 15 3	859 0 4	617 7 9	299 1 4	217 18 3
‡Asphaltic Limestone Concrete Co	110 0 0	90 0 0	94 10 0	—	—

‡ For tar paving only.

[*See also next page.*

CHELSFIELD.—For the erection of a pair of cottages at Chelsfield, Kent. Mr. St. Pierre Harris, architect, 8, Ironmonger-lane, E.C., and Orpington :—

F. Hind	£650	E. R. Thorne, Orpington*	£436
J. Smith	622		

FARNBOROUGH (Hants).—For the erection of a residence, Alexandra-road, for Miss Pincknay. Mr. W. E. Trevena, architect, Farnborough. Quantities supplied :—

Bottrill & Son	£2,362	McCarthy E. Fitt	£2,159
Martin Wells & Co.	2,300	Hawkin	2,005
Hooker	2,300	Hughes, Wokingham*	1,960
Kemp	2,200		

HAYDOCK (St. Helens).—For the erection of a factory for the Schwartzkopff Coal-Dust Firing Syndicate. Messrs. Charles H. Beloe & Frank E. Priest, engineers :—

Morrison & Sons	£6,000 0 0	Henshaw & Sons	£4,960 0 0
Roberts & Robinson	5,600 0 0	Neil & Sons	4,730 0 0
Thornton & Sons	5,195 0 0	C. Burt*	4,575 0 0
Holme & King	5,137 11 10	Holme & Green‡	4,450 0 0
J. Taylor‡	4,975 0 0	Jones & Sons‡	4,350 0 0

‡ Withdrawn.

HENDON.—For the construction of 1,010 yards of 15-in. pipe-sewer and 940 yards of 12-in. ditto, together with manholes and flushing-chamber, for the Urban District Council of Hendon. Mr. S. Slater Grimley, Engineer :—

T. Adams	£5,499 6 6	James Dickson	£3,770 16 4
E. H. Jackson	4,740 14 9	M. S. Ketteringham, Walthamcross†	3,650 3 0
Killingback & Co.	4,577 17 5	J. & F. Binns (too late)	3,597 4 2
Ballard, Ltd.	4,456 9 1		
Pedrette & Co.	4,321 0 0		
Clift Ford	4,118 0 0		

LONDON.—For road-making, tar-paving, &c., at the Western Hospital, for the Metropolitan Asylums Board :—

Wimpey & Co.	£3,300	Parry & Co.	£2,614
Thos. Adams	3,287	Ballard, Ltd., Child's Hill*	2,452
C. Ford	3,065	Wainwright & Co.	Informal
Bentham & Co.	2,749		
Grounds & Newton	2,680		

[Surveyor's estimate, £3,185.]

LONDON.—For alterations at No. 3, St. Bride's-street, E.C., for Messrs. Thos. Cook & Son. Mr. Frank E. Smee, architect, 12, West Smithfield, E.C. :—

Lascelles & Co.	£2,393 0	J. Nixon	£1,995 0
Spreckley & Co.	2,352 0	H. & E. Lea*	1,992 10
Smith & Sons	2,234 0		

LONDON.—For alterations to shop, No. 3, St. Bride's-street, for Messrs. Iliffe, Sons, & Sturmey. Mr. Frank E. Smee, architect, 12, West Smithfield, E.C. :—

H. & E. Lea* £227 10

LONDON.—For the erection of new printing and publishing premises, Norwich-street, Fetter-lane, E.C. Mr. Alfred Conder, architect, Palace-chambers, 9, Bridge-street, Westminster. Quantities by Mr. E. J. Paine, 11, Great James-street, Bedford-row :—

John Greenwood	£10,726	Akers & Co.	£9,294
Harris & Wardrop	10,640	Stimpson & Co.	9,260
F. & F. J. Wood	10,400	E. Toms	8,919
Grover & Son	9,770	J. Appleby	8,790
L. H. & R. Roberts	9,387	Hy. Young*	8,693

ORPINGTON.—For the erection of two small houses at High-street, Orpington, Kent. Mr. St. Pierre Harris, architect, 8, Ironmonger-lane, E.C., and Orpington :—

Smith & Sons	£530	J. Smith	£425
W. Owen	498	Somerford & Sons, Orpington*	399
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PURTON (Wilts).—For the construction of covered service reservoir, Pavenhill, and other water supply works, for the Cricklade and Wootton Bassett Rural District Council. Mr. F. Redman, engineer, Newport-street, Swindon :—

J. & T. Binns	£2,396 0 0	Fleweeling & Huckson	£1,669 0 0
J. James	1,861 10 0	Smith & Son	1,515 12 0
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Smith & Watkins	1,712 12 6	Winchcombe, Wroughton, Wilts*	1,542 5 0
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J. Spooner	545 0	G. Smith	397 0
R. & J. Carr	490 0	H. Dukes	340 0

WALMER (Kent).—For the erection of a residence on the Leith Estate, for Mr. W. H. F. Sanders. Mr. Edward W. Fry, architect, Cannon-street, Dover. Quantities by architect :—

	House.	Boundary Fences.
Hayward & Paramor	£2,139	£176 0
J. E. Turner	1,996	160 0
Denne & Son	1,866	163 0
W. Bromley	1,858	170 0
J. J. Wise	1,848	157 0
T. T. Denne	1,840	156 0
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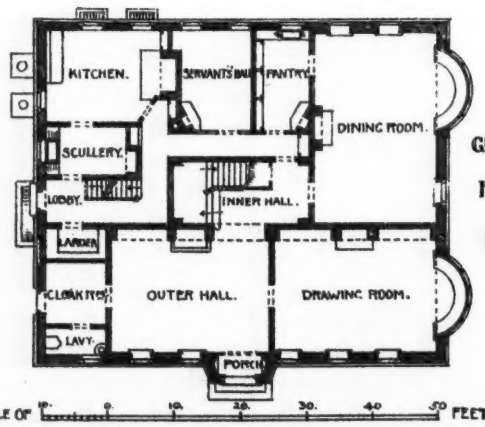

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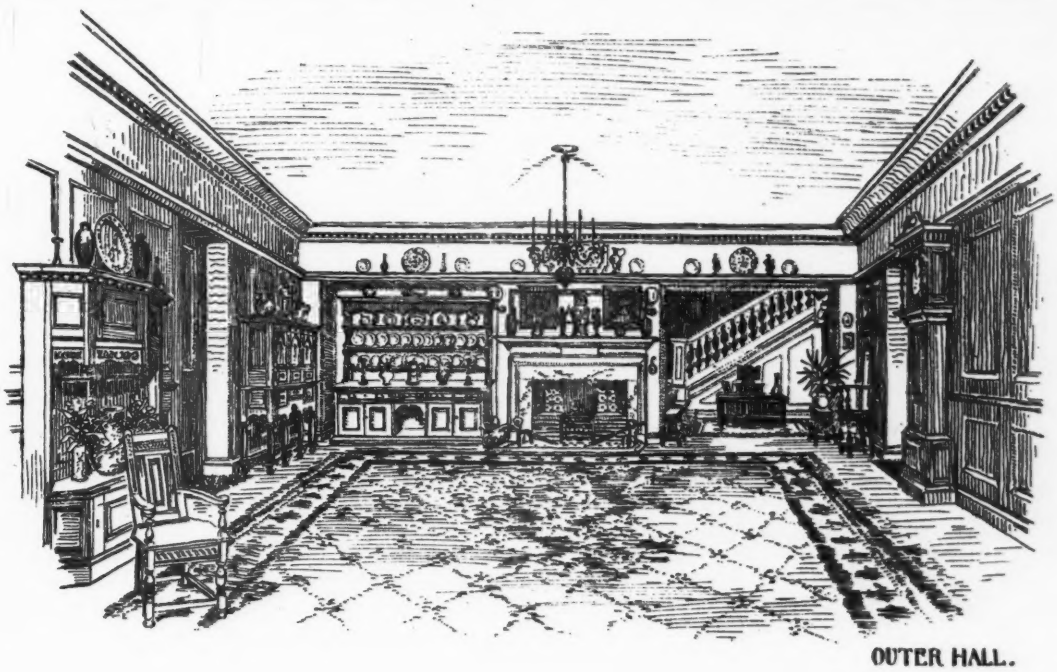

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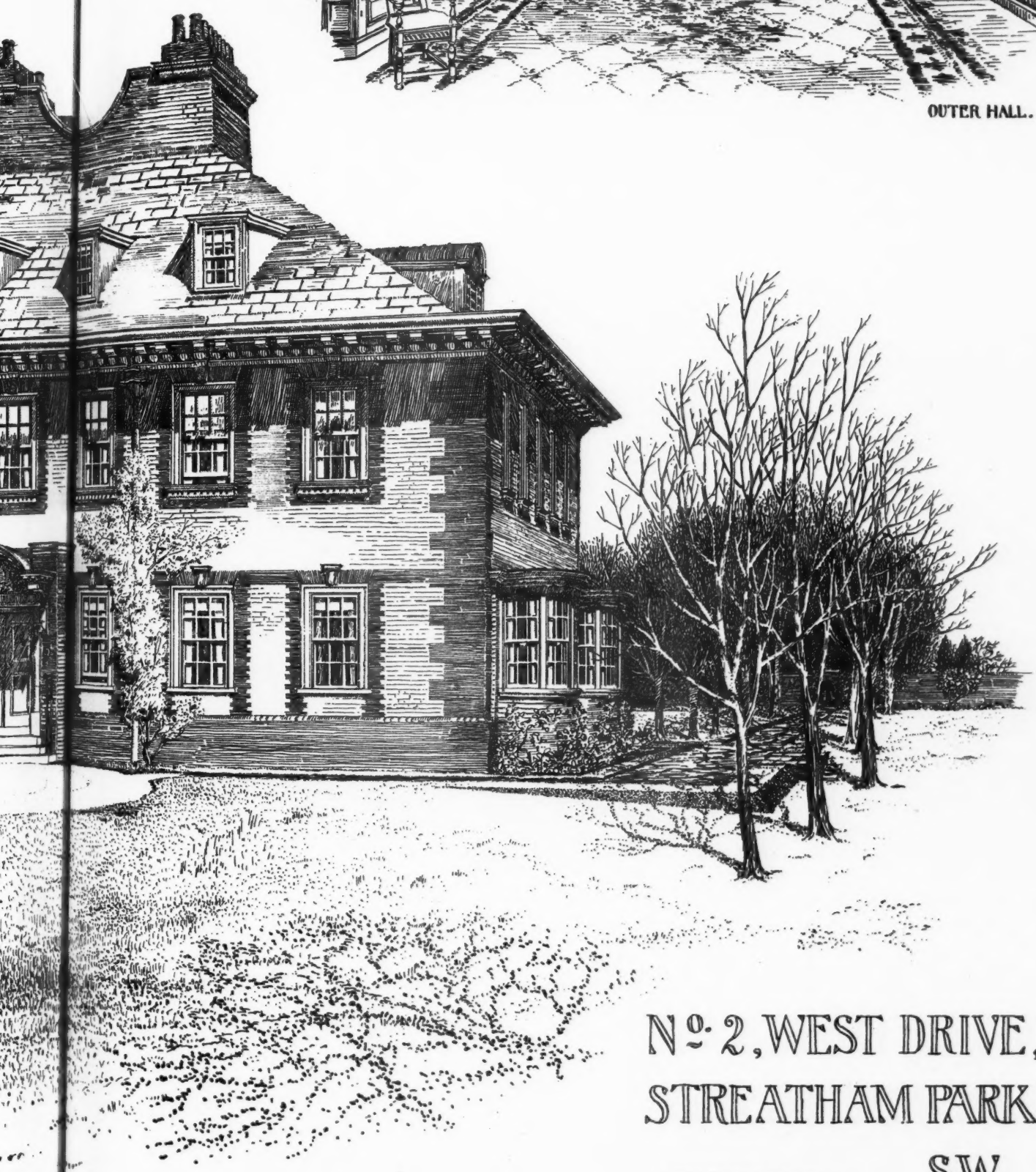

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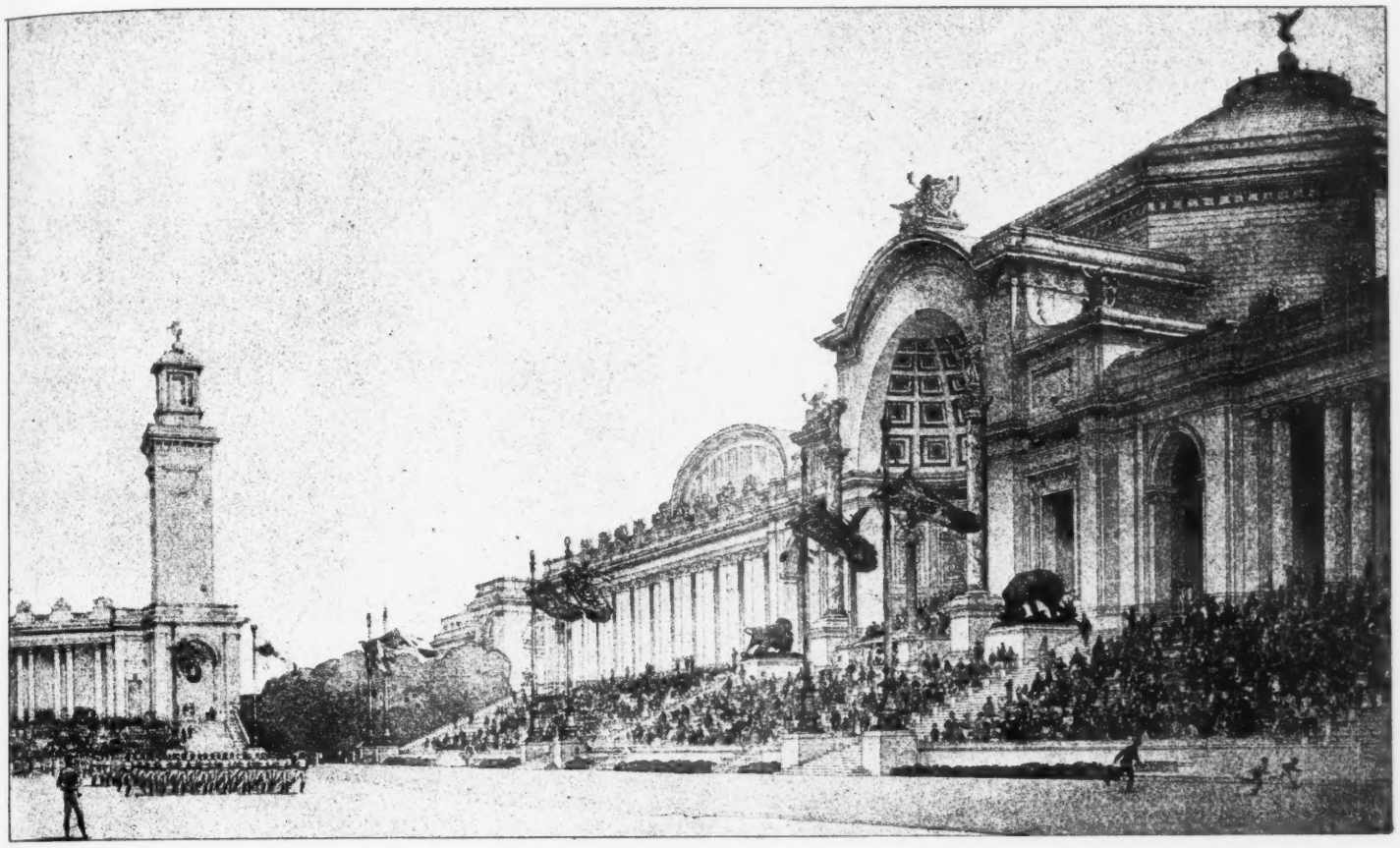

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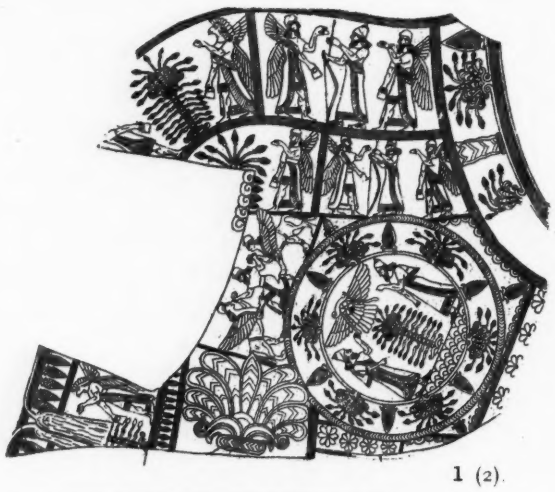

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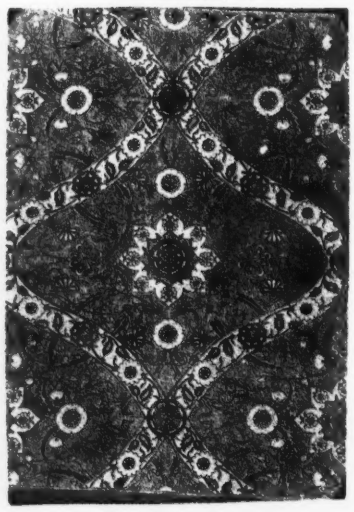

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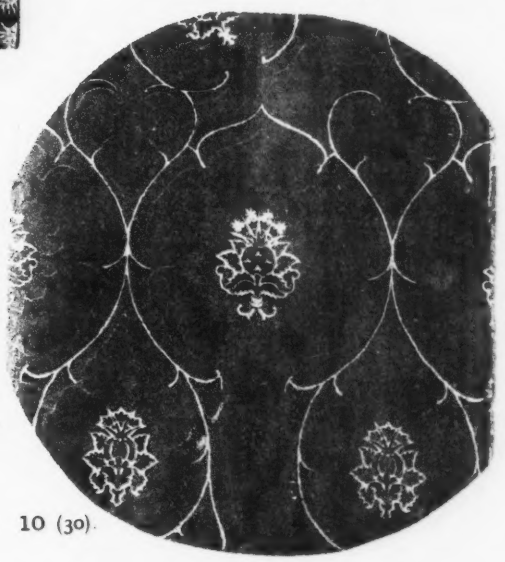

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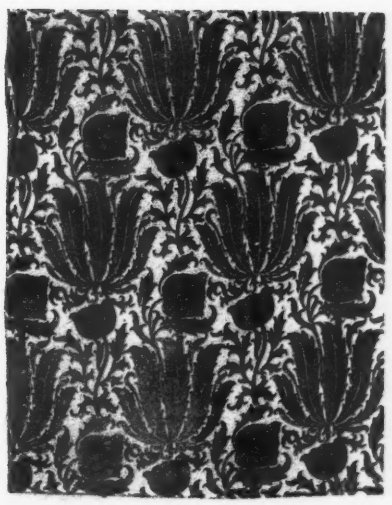

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